ELECTRICAL WORLD

A consolidation of Electrical World, Electrical Engineer and American Electrician

L. W. W. MORROW
Editor

ALLEN M. PERRY
Managing Editor

A. E. KNOWLTON
Associate Editor

E. R. SEARLES
News Editor

G. F. WITTIG
Statistical Editor

EARL WHITEHORNE
Contributing Editor

FRANK R. INNES
Western Editor
520 N. Michigan Ave.
Chicago

H. S. KNOWLTON
New England Editor
1427 Statler Bldg.
Boston

PAUL WOOTON
Washington
Correspondent
National Press Building
Washington

JAMES H. RUDD
Publishing Director

ANNUAL PROGRESS AND STATISTICAL NUMBER

Contents, Copyrighted, 1933, by McGraw-Hill Publishing Company, Inc.

VOLUME 101 . . . NUMBER 1

JANUARY 7, 1933

News of the Industry 1

Bright Horizons in View 6

Utilities Improve Operations 9

Manufacturers Record Deficits 11

Outstanding Facts 13

Utility Revenue Holds Up 14

Energy Generated Totals 77.5 Billion Kw.-Hr. 16

Customers Aggregate 24,187,151 19

Stock Market Prices 21

1,700,000 Kw. in New Stations 22

Conditions in Nine Regions 24

Maturities and Earnings 26

Financing Totals $465,920,000 28

Unit Operating and Financial Ratios for Utilities Vary Widely .. 30

Operating and Maintenance Expenses Reduced 32

$51,000,000,000 of Undeveloped Markets 33

THE HOME—A $21,000,000,000 MARKET
THE FARM—A $4,575,000,000 MARKET
MAIN STREET—A $2,843,000,000 MARKET
TRANSPORTATION—AN $11,530,000,000 MARKET
INDUSTRIAL PLANTS—A $2,777,000,000 MARKET

Capital Expenditures Decreased 43

Manufacturers Hit But Courageous 44

Business and Financial Status of Representative Electrical Manufacturers 46

Directory of Electrical Associations 48

Electrical World articles are indexed in Industrial Arts and Engineering indexes, available in public libraries

Published weekly. $5 per year, 25 cents per copy. Central and South American countries, $7. Foreign, $9 U. S. currency, or 45 shillings per year. Canada subscription price (including Canadian duty), $7.50. Entered as second-class matter, January 20, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A. Cable Address: "MCGRAWHILL, N. Y." Member A.B.P. Member A.B.C. Number of copies printed this issue, 14,540.

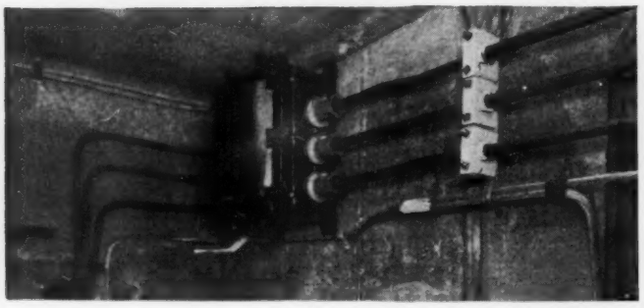
McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

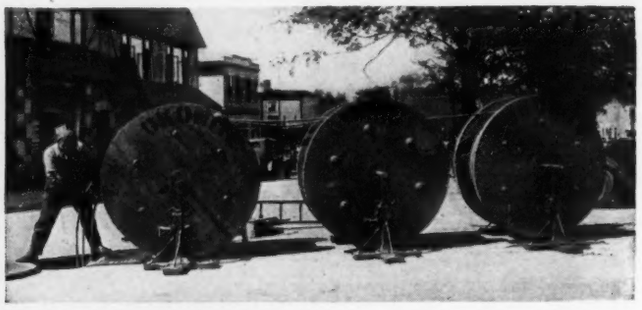
Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C.; Los Angeles. James H. McGraw, Chairman of the Board; Malcolm Muir, President; James H. McGraw, Jr., Vice-President and Treasurer; Mason Britton, Vice-President; Edgar Kobak, Vice-President; H. C. Parmelee, Vice-President and Editorial Director; Harold W. McGraw, Vice-President; C. H. Thompson, Secretary.

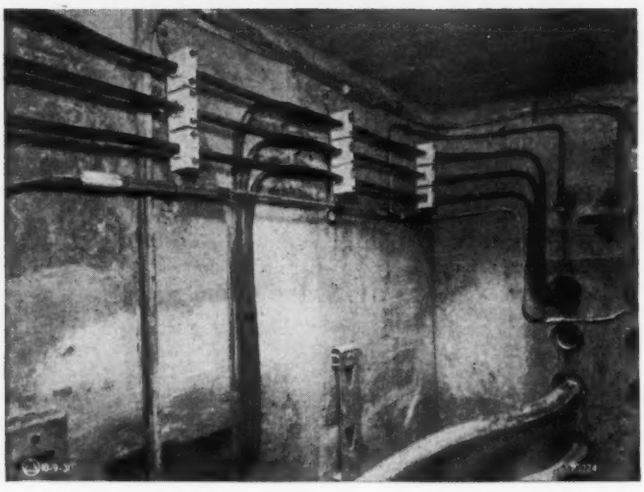
REVOLUTIONIZES UNDERGROUND DISTRIBUTION

OKOSHEATH

(an underground cable without metallic sheath)







OKOSHEATH cable greatly simplifies underground distribution work and reduces costs by savings in both time and materials. Okosheath is for installation either in ducts or directly in soil. Use of this cable will at once show the ease with which it can be handled, installed, racked, and spliced.

Immediate investigation of Okosheath features may show where postponed distribution work can be resumed. Those first estimates can be revised downwards with this construction. Now, during the depression, is the time to start such cost-saving practice. Prices and all particulars will gladly be furnished.

THE OKONITE COMPANY

Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC.

Factories: Passaic, N. J. Paterson, N. J.

SALES OFFICES:

NEW YORK CHICAGO SAN FRANCISCO PHILADELPHIA LOS ANGELES PITTSBURGH SEATTLE BOSTON DALLAS ATLANTA

Novelty Electric Co., Philadelphia, Pa.
The F. D. Lawrence Electric Co., Cincinnati, O.

Canadian Representatives
Engineering Materials, Limited, Montreal

Cuban Representatives
Victor G. Mendoza Co., Havana

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

ELECTRICAL WORLD

Established 1883. McGraw-Hill Publishing Company, Inc.

for the Week Ending

January 7, 1933

1932 REVIEW AND A LOOK AHEAD + + + ENERGY GENERATED TOTALS 77,500,000,000 KW.-HR. + + + 24,187,000 CUSTOMERS + + + NEW FINANCING TOTALED $465,920,000 + + + OPERATING AND FINANCIAL RATIOS OF 56 UTILITIES + + + MANUFACTURERS' BALANCE SHEETS + + + $51,000,000,000 OF UNDEVELOPED MARKETS.

New York Governor Urges Expansion of Municipals

In his message to the New York State Legislature on January 4 Governor Lehman recommended that this year legislation be adopted permitting the municipalities of the state, acting either alone or in combination with other municipalities, to purchase and sell electrical energy after approval by a referendum to the voters of the municipality involved. By the laws of 1931 the Power Authority was directed to provide that a reasonable share of the St. Lawrence electricity be set aside for the use of municipalities authorized to engage in the distribution of electrical energy. In this way, Governor Lehman feels, not only will the municipalities be given access to cheap electricity, but the right thus given will provide an effective means of competitive bargaining by the municipalities with existing utility companies.

Commenting on public utility regulation the Governor said: "I recommend that the Public Service Commission be given authority to approve or disapprove any arrangements, agreements, contracts or payments between operating companies and holding companies so as to establish a more effective control over operations and expenditures. I recommend that after July 1, 1933, operating companies in the State of New York should be forbidden to lend funds to companies which hold their stocks. . . . I also recommend that municipalities be given the right to appear as a party in all proceedings before the Public Service Commission and before courts affecting the rates or service of utilities within their areas. . . . I believe that it would be highly proper to assess the cost of regulation, either in whole or in part, upon the utilities themselves, particularly the cost of special investigations in connection with the transfer or purchase of properties, the consolidation or merger of corporations, and in connection with rate cases. . . ."

▼

Circuit Breaker Interrupts 895,000 Kva., Single Phase

What is said to be the largest amount of current and power ever interrupted by a circuit breaker was recently opened at the East Pittsburgh plant of Westinghouse Electric & Manufacturing Company. The breaker was tested at 50,000, 70,000, 79,000, 90,500 and 118,000 amp. at 7,600 volts. This is from 380,000 kva. to 895,000 kva., single phase, or 1,140,000 kva. to 2,685,000 kva., three phase equivalent.

Recent developments in Deion grid arc-interrupting devices made this possible. Oil, grids and breaker parts are reported to have survived in excellent condition and to be ready for further service. This, according to Westinghouse engineers, is due mainly to the fact that in 1/60 of a second after the contacts parted the arc was extinguished. The arc energy was reduced, gas generated low and total pressure developed in the tank, being in proportion, was therefore negligible.

▼

Insull Collateral Bid In by a New York Bank

Stocks pledged with the Central Hanover Bank & Trust Company as security for loans to the National Public Service Corporation totaling $5,750,000, negotiated while the property was under Insull management, were acquired by the bank at public auction last week for the amount of the loans. While the prices failed by several thousand dollars to cover interest in arrears on the notes, the bank does not intend to enter a deficiency claim against the receivership estate. Representatives of the bank were the only bidders.

A total of 501,275 shares of no-par common stock of the New England Public Service Company, representing 52.1 per cent of the shares, was sold for $1,800,000; 44,491 common shares of Eastern New Jersey Power Company and 163,350 no-par common shares of the Jersey Central Power & Light Company were sold for $3,200,000, the shares representing 32.4 per cent control of the companies; 10,313 shares of Jersey

Central Power & Light preferred stock were sold for $650,000, and 116,600 common shares of Central & South West Utilities Company were sold for $100,000.

Efforts to prevent the sale of the stocks were made earlier in the week by interests that had been endeavoring to reorganize the Eastern Insull properties, but Judges Goddard and Swan of the United States District Court and Judge Manton of the Circuit Court of Appeals refused to issue restraining orders after hearing pleas by the interests involved. Possession of the collateral by the Central Hanover Bank & Trust Company will have a definite bearing on the reorganization of the eastern units because a majority of New England Public Service shares and a third interest in the Jersey Central Power & Light are included in the securities now owned by the bank.

In commenting on the sale of the collateral Charles A. McCulloch, co-receiver with E. N. Hurley of the Middle West Utilities Company, said: "Mr. Hurley and myself were naturally disappointed when the sale finally went through. . . . This is no time to sell utility properties. In my opinion the bank bought in a lot of cheap properties and I am going to watch with interest to see what prices they eventually get for them. . . ."

Meanwhile, Samuel Insull equanimously continues to enjoy the hospitality of the gift-bearing Greeks. Although there have been many rumors concerning his future actions, Mr. Insull, aside from saying that he intended to remain in Greece indefinitely, has given no detailed account of his plans.

▼

Detroit Edison Defends Its Accounting Methods

Replying to the brief of the Michigan Manufacturers' Association filed with the Michigan Public Utilities Commission charging that the Detroit Edison Company included among its assets property belonging to associate companies and that its electrical operations have been burdened with costs properly belonging to other services, such as heating and gas (ELECTRICAL WORLD, December 31, page 842), the Edison company maintains that its books are accurately kept in strict accordance with the rules prescribed by the commission. The company's brief invites the commission, through its examiners and auditors, to inspect its books and accounts and to check and verify its accounting procedure. "There is no warrant in law for a temporary rate order reducing in any amount the respondent's charges for electrical service," the brief continues. "Such an order in the absence of a determination of fair value from legal evidence would be illegal and properly to be set aside by the courts."

1933—A Year of Promise—At a Price

Forgetting all the minor fluctuations of the various indexes and overlooking the implications of serious and unsolved problems, 1933 is not without its hopeful promise. The steady drop in commodity prices appears to have carried them to resistance levels of considerable strength, virtually the levels touched last midsummer when trade volumes were at their lowest too. The sustained ability of energy production, carloadings and bituminous coal output to rise as they have indicates recuperative power of no mean significance. It is not likely that trade volumes or average prices will be lower in 1933 than last year. It is possible that by the end of the year considerable improvement may be reported.

True, there are the familiar unsolved problems of world trade and world debts; necessity for capital readjustments and of protecting investors; helping the farmer and avoiding inflation; balancing the national budget and holding down taxation; of being both progressive and conservative.

But they are PROBLEMS which CAN BE SOLVED IF PEOPLE WANT TO SOLVE THEM. If 100 per centers forego their flag waving. If railroads, industries, home owners and farmers will join with insurance companies, mortgage and bond holders, investors and banks to make adjustments to 1933 facts and possibilities. If politics be subordinated to economics. If government activities are minimized and the veteran racket killed. IT CAN BE DONE, and 1933 made the basis for regained business health, IF AMERICA WANTS TO PAY THE PRICE — AND REAP THE REWARDS.

▼

7 Tons of Candles a Year to Light a Small Home

Assuming a small house with an energy use of 7 kw.-hr. a week for lighting in winter months and 2.7 kw.-hr. a week throughout the summer, W. J. Jones estimated, in a recent talk before the Royal Society of Arts (England), that the annual weight of candles required to maintain a similar degree of illumination would be 15,340 lb.—close to 7 tons.

Based upon an energy rate of 7 cents a kilowatt-hour and with candles at 10 cents a pound the *weekly* bill during the six winter months would be $22 and during the summer months $8.40.

To illuminate a modern underground train by means of candles to the same level of illumination as that at present provided by electric light it would be necessary to load on the train at the commencement of each day's operation some 2 tons of candles.

To give the same amount of light in the Palace of Westminster as that now obtained by electricity, some half million candles would be consumed per day.

Mr. Jones also presented this table:

Illuminant	Candle-Hours, for 2 Cents	Times More Expensive than Electricity
Matches	0.4	485
Candles	4.5	45
Oil lamp	6.8	30
Electric lamp	202	...

▼

House-to-House Appliance Selling

One of the features of department store merchandising — distribution of major electrical appliances by house-to-house canvassing—is the subject of a preliminary report just issued by Dr. Kenneth Dameron of the Electrical Merchandising Joint Committee. The report analyzes the outside selling activities of 35 department stores, showing that canvassers are being used in the sale of vacuum cleaners, washers, refrigerators, radios and ironers, and that commissions ranging from 10 to 20 per cent are paid. In the course of the survey many questions have been raised which are as yet unsettled, such as commissions paid, allocation of territories, supervision, concentration of selling by item, and relations with inside selling force.

▼

Wedding Deadline Set for Utility Women Workers

"Before July 1 or never," Kansas City Power & Light has told its women workers who hope to marry yet retain their jobs too. Six months to make reluctant Romeos join the blissful benedicts or disillusioned day dreamers. Cupid *à la carte* indeed.

Officially the company says this, in putting a premium on speed and skill, and acclaiming the desirability of "recognizing the stabilizing influence of the family home and appreciating the necessity of providing young men with employment which will permit them to marry.

"No married women to be employed.

"Married women already employed will not be asked to resign at this time. A survey indicated such readjustment would cause considerable hardship in the majority of cases. With the return of normal times this temporary policy will be reversed.

"Any single woman employed intending to marry and desiring to retain her employment must do so on or before July 1, 1933. After July 1, 1933, any single woman employed marrying will resign at once."

Courts Enjoin Commissioner in Oregon Rate Cut

Pending hearing of the case, an interlocutory injunction has been issued in federal court restraining State Public Utilities Commissioner Charles M. Thomas from attempting to enforce orders for lower power rates on the Northwestern Electric Company (ELECTRICAL WORLD, October 8, page 484). Federal District Judges John H. McNary and Alger Fee and Federal Circuit Judge Curtis D. Wilbur of San Francisco granted the injunction. A preliminary injunction was granted November 4.

New charge against Northwestern

Based upon the allegation that the Northwestern Electric Company neglected to comply with an order issued by the commission during 1928 requiring the utility to submit a detailed inventory and appraisal of its properties, the present one-man commission, C. M. Thomas, has addressed a communication to the state Attorney-General in which he recommends the prosecution of the company. Under Section 61-273 of the 1930 commission laws the commissioner is directed to institute proceedings to enforce departmental orders unless restrained by the courts.

In addition, Mr. Thomas announced that he will recommend to the 1933 Legislature the enactment of a law based on the California statute providing for the regulation of public utility securities. He maintains that unless complete authority is given to him on the subject of securities there is no hope of securing effective regulation in the state.

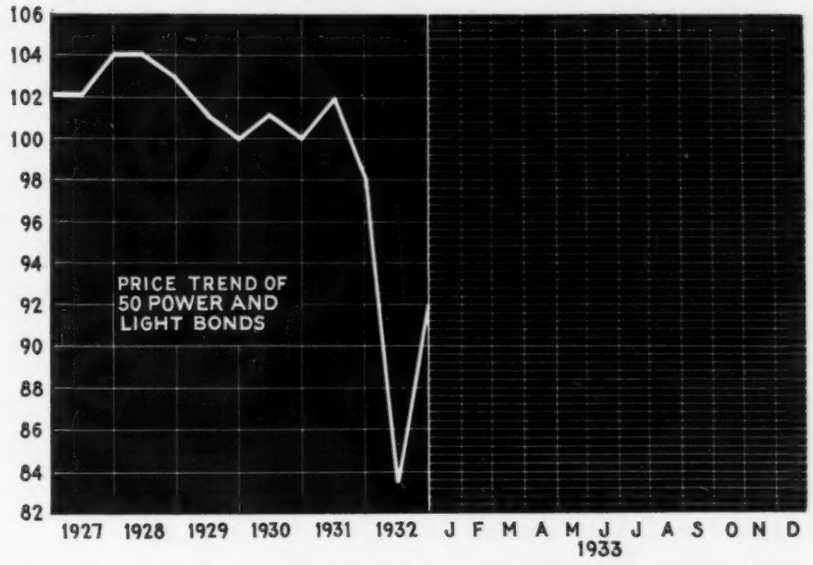
A proposal of one of the commissioners of the Portland, Ore., City Council to tax the gross revenues of Portland General Electric Company and Portland Gas & Coke Company 3 per cent as a means of relieving some of the property tax was killed December 30. The Northwestern Electric Company, also serving the city, pays such a tax now under its franchise. Officials of the Portland companies pointed out that declining revenues were not now sufficient to meet such a levy out of net earnings and that the tax would have to be passed on to the consumer.

▼

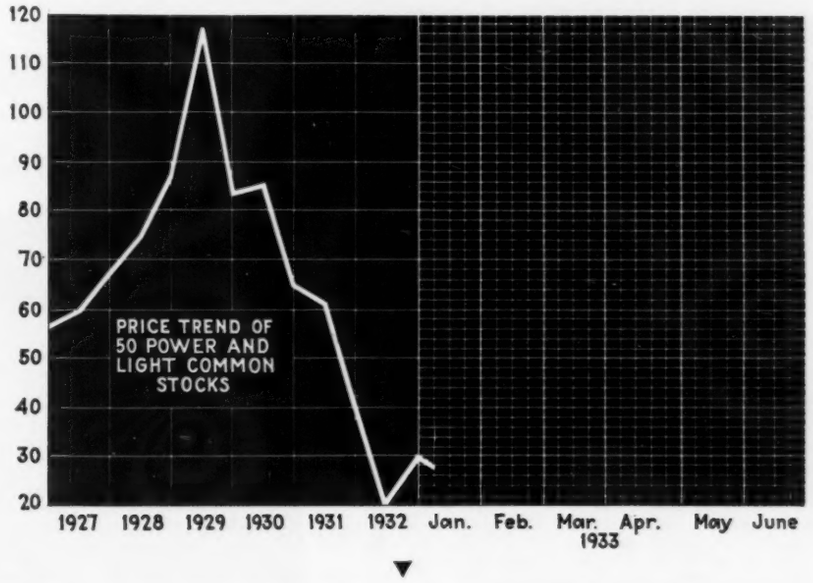
Louisville Survey Authorized

In accordance with the suggestion of Mayor Harrison of Louisville, Ky. (ELECTRICAL WORLD, December 17, page 808), J. G. Wray & Company, Chicago engineering firm, has been retained to assist the Public Utilities Bureau in a survey of Louisville Gas & Electric Company's operations, on which recommendations for an adjustment of gas and electric rates will be based. Completion of the survey is scheduled for March 15, 1933. The existing electric contract expires in March.

Utility Bonds Firm; Stocks Recede



Although no marked strength developed in public utility bonds during December, prices held firm. The new year opened with utility stocks under moderate pressure, the "Electrical World" index receding to 27.7, as compared with 29.4 at the close of last year



▼

Year's Financing Is One-third 1931's Total

New security offerings by electric light and power companies in 1932 totaled about a third of those for 1931 (see page 28). Financing during December amounted to $4,336,000. The average yield rose from 4.7 per cent in 1931 to 5.65 per cent in 1932.

Name of Company	Amount of Issue (Par Value)	Period (Years)	Class	Purpose	Interest Rate	Price	Per Cent Yield
Long Island Lighting Co.	$1,658,000	23	First ref. mtge. gold bonds, series B 5 per cent	For additions, extensions and improvements	5	94	5.45
Mississippi Valley Public Service Co.	2,000,000	22	First mtge. gold bonds	To pay outstanding funded debt	5	92	5.64
Pennsylvania Power Co.	678,000	24	First mtge. gold bonds	For additions and improvements	5	98	5.15
Total	$4,336,000						

Coming Meetings

American Engineering Council—Washington, D. C., Jan. 15. L. W. Wallace, 774 Jackson Place, Washington, D. C.
National Electrical Manufacturers' Association — Midwinter meeting, New York, Jan. 16-19. A. W. Berresford, 570 Lexington Ave., New York.
American Institute of Electrical Engineers—Winter convention, New York, Jan. 23-27. H. H. Henline, 33 West 39th Street, New York.
Great Lakes Division, N.E.L.A.—Fifth annual sales conference, Chicago, Feb. 16-17. T. C. Polk, 20 No. Wacker Drive, Chicago.
National Accounting Section, N.E.L.A. Committee meetings, Chicago, Feb. 20-21. A. J. Marshall, 420 Lexington Ave., New York.
New England Division, N.E.L.A.—Engineering Section, Boston, Mass., March 2-3. O. A. Bursiel, 20 Providence St., Boston.
Oklahoma Utilities Association—Oklahoma City, Okla., March 7-8. E. F. McKay, 1020 Petroleum Bldg., Oklahoma City, Okla.
National Sales Section, N.E.L.A.—Committee meetings, Chicago. March 21-23. A. J. Marshall, 420 Lexington Ave., New York.

Baltimore Utilities Asked to Cut Rates Voluntarily

At informal meetings with the officials of the Consolidated Gas, Electric Light & Power Company of Baltimore and the Chesapeake & Potomac Telephone Company, the Maryland Public Service Commission is urging the companies to reduce their rates voluntarily to keep charges in line with present price levels. Harold E. West, chairman of the commission, is quoted as expressing the hope that rates will be lowered in 1933 without the necessity of long and excessive formal proceedings.

New York Metal Prices

	Dec. 27, 1932 Cents per Pound	Jan. 3, 1933 Cents per Pound
Copper, electrolytic	5.00	5.00
Lead, Am. & S. R. price	3.00	3.00
Antimony	5.40	5.40
Nickel ingot	35.00	35.00
Zinc, spot	3.475	3.475
Tin, Straits	22.80	22.75
Aluminum, 99 per cent.	23.30	23.30

Larger Output in November Shown by Geological Survey

Average daily energy output of public utility plants in November was 2 per cent greater than in October, the U. S. Geological Survey reports. The normal increase is about 0.5 per cent. Total production was 6,937,000,000 kw.-hr., against 7,053,000,000 kw.-hr. in October; 7,406,000,000 kw.-hr. a year ago.

The deficiency compared with 1931 has been gradually decreasing. In August it was 12 per cent. During the next three months it was successively 11, 9, and in November 6 per cent.

Output from water power was 2,865,000,000 kw.-hr., or 41 per cent of the total. The daily average was 9 per cent over October and 36 per cent over November, 1931. These marked increases reflect the increased streamflow due to the increase in precipitation and indicate the end of drought conditions which have persisted during the past two or three years.

Wisconsin Utility Requests Rate Investigation

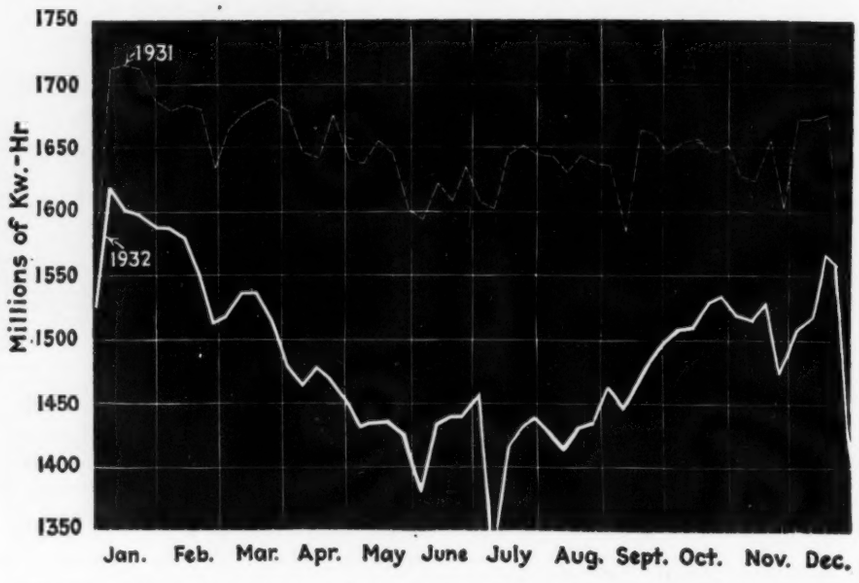
Taking the initiative after several communities which it serves had requested lower rates for electric service, the Wisconsin Michigan Power Company has asked the Wisconsin Public Service Commission to investigate the rates and practices of all the company's utility operations. R. E. Moody, vice-president and general manager, maintains that a reduction in rates is not justified, the income account showing that during the first ten months of 1932 the rate of return to the company on its capital employed having been only 4.33 per cent. According to the petition, the company believes itself entitled to the pronouncement of the commission as to the reasonableness of its rates and practices in the conduct of operations.

The petition says in part: "It has been the policy of the power company to reduce its rates when revenues and earnings have been sufficient to justify such reductions. This policy will be maintained in the future and the present application will in no way prevent further reductions in rates if earnings become sufficient so that they can be offered without impairing the company's credit. The Wisconsin Michigan Power Company, in common with other industries, has suffered material reductions in revenue during the past two years, which have been met so far as possible by operating economies. It is not within the power of the management, however, to reduce certain large items of expense like taxes. During 1931 the total tax bill amounted to $494,483 and in 1932 it is estimated to be $522,580, an increase of 5.7 per cent."

Output for Year Down 9½ per Cent

On the basis of records from January to November it is estimated by the Geological Survey that the total production of electrical energy for public use in 1932 will be about 83,000,000,000, or 9.5 per cent less than in 1931. The change from 1930 to 1931 was a decrease of 4 per cent. These figures relate to the aggregate of all energy output for public use, not electric light and power alone.

Kilowatt Hours Take a Holiday



Energy output of central stations in the week ended December 31 is estimated at 1,414,710,000 kw.-hr., it is announced by the National Electric Light Association. Comparisons cannot well be made with 1931 because current figures are for a week that included Christmas, which fell on a Sunday, with Monday also a holiday, whereas the nearest corresponding week a year ago was that of January 2. Christmas week this year dropped 139,000,000 kw.-hr. from the preceding; last year 111,000,000 kw.-hr.

Weekly Output, Millions of Kw.-Hr.

Week Ended	1932	1931	1930	1929
December 31	1,415	1,524	1,597	1,680
December 24	1,554	1,565	1,617	1,638
December 17	1,563	1,676	1,770	1,860
December 10	1,519	1 672	1,748	1 841
December 3	1 510	1 671	1,747	1 806

Major New Construction This Week

Bids asked until January 12 by Metropolitan Water District, Los Angeles, Calif., for construction of transmission line along route of Colorado Aqueduct, including 79 miles, 66,000 volt line and 52 miles, 33,000 volt line; also, for one 6,000 kva. power substation, twelve 1,000 kva. substations, and two 750 kva. distribution substations.

Heavy duty motors, electric hoists, loading and conveying equipment, etc., will be installed at sulphur mining plant at New Iberia, La., of R. J. Alshire Oil Company. Estimated cost over $100,000.

Motors, panelboards, electric hoists, conveyors, etc., will be installed by Cary Manufacturing Company, Waupaca, Wis., in heating equipment manufacturing plant. Cost over $100,000.

Plans authorized by Bureau of Power and Light, Los Angeles, Calif., for power substation. Cost over $75,000 with transformers, switchgear and accessory equipment.

Heavy duty motors, refrigerating machinery, electric hoists, electric elevators, conveyors, etc., will be needed for addition to brewing plant of Jacob Ruppert Corporation, New York, N. Y. A $500,000 project.

Machine drives, motors, transformers and accessories, regulators, electric hoists, conveyors, etc., will be required for plant of Home Brewing Company, Canton, Ohio. Estimated cost over $100,000.

Trade Acceptances Backed by Electrical Credit Body

By unanimous vote of the board of managers the National Electrical Credit Association has gone on record as favoring the general use of short-term trade acceptances from responsible customers in payment for goods sold and the giving of trade acceptances in payment for goods bought, such trade acceptances as the members receive to be discounted at their bank or sold to banks through note brokers. Banks receiving these trade acceptances will be urged to make a practice of rediscounting them with Federal Reserve banks.

The advantages to the creditors are as follows: Liquid or discountable commercial paper is substituted for open book accounts; while sales of goods on an open account basis may be in accordance with prescribed terms, it is recognized that payments are not always made in accordance with these terms; whereas if the account is adjusted by a trade acceptance, a definite and fixed maturity is established, and by the substitution of a trade acceptance for an open account obligation, not only is the maturity more definite, but there is a definite and specific acknowledgment of the obligation.

"It is unfortunate," according to an official N.E.C.A. statement, "that there has been considerable abuse in the use of trade acceptances due to the fact that buyers, in paying their account on an acceptance basis, have quite generally expected longer terms than the seller's standard terms. This practice, together with the practice of expecting a 2 per cent or other cash discount privilege when accounts are paid on an acceptance basis, should be discouraged. A trade acceptance is not the proper instrument to use in adjusting a past due indebtedness, where a promissory note should, of course, be used. As a general procedure, interest is not added on trade acceptances when such acceptances are actually used to replace open book accounts."

▼

Ontario Commission Assumes Underwriters' Products Service

In accordance with the expressed preference of the majority of Canadian electrical manufacturers, whose products have heretofore been listed by Underwriters' Laboratories, to employ the services of the Hydro-Electric Power Commission of Ontario for the listing of their products, Underwriters' Laboratories, listing, label and re-examination services on electrical devices and materials manufactured in the Dominion of Canada are to be discontinued on January 1.

All, or nearly all, of these Canadian electrical products will be listed by the Hydro-Electric Power Commission of Ontario, which will extend to them its listing and label service as already applied to other Canadian electrical products. Lightning rods and motors, controllers and fittings for use in hazardous locations will continue to be tested and listed by Underwriters' Laboratories.

▼

Refrigerator Sales Treble for Grigsby-Grunow

In reporting upon the results of 1932 operations and the prospects for 1933, John F. Ditzell, assistant vice-president of the Grigsby-Grunow Company, points to marked improvement in the refrigerator business of his organization. According to Mr. Ditzell there are four times as many unfilled orders on file now as at any other similar time in the history of the company.

"Shipments of refrigerators during October and November and up to December 20 were three times larger than the same period of 1931," Mr. Ditzell stated.

"Inventories of refrigerators in hands of distributors on December 22 were less than one-third of the number on hand on the same date last year. When it is realized that in 1931 we had only three models of refrigerators, compared with fourteen models in 1932, it can be seen just how our distributors' inventories are."

▼

Edison Appliance to Market New "Hotpoint" Ranges

Sales efforts of the Edison General Electric Appliance Company, Inc., will be concentrated on a new line of electric ranges to be marketed nationally under the trade name "Hotpoint," according to an announcement made by George A. Hughes, president. Factory sales representatives will directly contact the public utilities and important range dealers throughout the country.

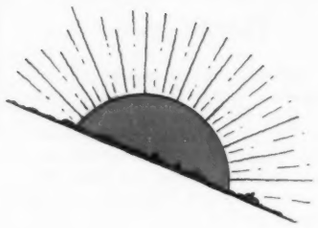
For the past few years this company has marketed electric ranges under the trade name "General Electric—Hotpoint." With the announcement of a "Hotpoint" line to be sold direct from Chicago, the General Electric Company in Cleveland is announcing a separate line of "General Electric" ranges to be sold through General Electric refrigerator distributors.

Brief History of the "Electrical World"

The *Electrical World* (published under that name since 1883 and tracing its history back to 1874) is a consolidation of the *Electrical Engineer* (founded in 1882 as the *Electrician*) and the *American Electrician* (founded in 1896). Final consolidation under the title of *Electrical World* took effect on January 1, 1906, the *Electrical World* and the *Electrical Engineer* having been acquired by the McGraw Publishing Company in 1899 and amalgamated as the *Electrical World and Engineer,* and the *American Electrician,* a McGraw monthly, having been absorbed seven years later.

The roster of past editors of the *Electrical World* includes Carl Hering, Louis Bell, W. D. Weaver, T. C. Martin, C. O. Mailloux, D. H. Braymer and many other men prominent in the electrical industry—some, like those named, no longer living, and others, like W. H. Onken, Jr., A. S. McAllister, Frank F. Fowle, F. M. Feiker, and H. V. Bozell, still active in engineering and industrial service. L. W. W. Morrow is now editor. Allen M. Perry is managing editor. Other members of the present staff are: A. E. Knowlton, associate editor; E. R. Searles, news editor; G. F. Wittig, statistical editor; Earl Whitehorne, contributing editor, and E. M. Glennon, assistant editor; F. R. Innes, Western editor; H. S. Knowlton, New England editor; and Paul Wooton, Washington correspondent.

Bright Horizons in View



THERE is no time schedule for business recovery, but the facts indicate that revival is coming. Faith has increased. Hope has replaced apathy. Doubt is giving way before signs of active business and renewed prosperity.

• In the next few years individuals and corporations in the electrical industry will prosper greatly. Electrical men are sagacious and alert enough to anticipate new needs, new commodities and new markets. They should be conspicuous because of their accomplishments.

• Electrified America means more conveniences, better homes, increased productivity, greater consumption, the elimination of drudgery, more leisure, more happiness and an advanced standard of living. New ideas are going to be applied in business. New electrical inventions will come from research workers and engineers. Three years have taught lessons and encouraged developments that will be used for achievements.

• Acceptance of new conditions, work to capitalize developments, co-operation to bring prosperity—these are the principles for industry guidance. Public welfare will be the test of business policy, and added comfort, utility and beauty for the multitude are the foundations for building electrical industry prosperity.

• This issue of "Electrical World" gives facts about the industry. These facts should be interpreted and applied. In addition, there are significant new developments and trends that should be studied because of their influence upon present practices and their possibilities for application in the future. Some of these many developments, facts and trends are summarized in these pages. They indicate that faith in the future is well founded.

Organizations and Policies

• Holding Companies

Decentralization, with responsibilities placed upon operating property executives. Full publicity about all aspects of interest to consumers and investors. Charges to owned subsidiaries largely fixed by actual costs. Elimination of pyramid organizations and of engineering and construction corporate affiliates. Write-down of investments and decreased outstanding stock by some companies. General relief from the financial pressure created by 1930-31 maturing notes and securities. Three or four failures only in the utility holding company group. General policy of conserving earnings and reducing capital expenditures to essentials.

• Operating Properties

Maintenance expenditures needed. Earnings very stable. Sales plans for co-operative and aggressive selling instituted. System planning and system cost analysis instituted. Intensive study of competitive power situation. Customer, employee and public relations receive attention. Rate cases and municipal plant agitation in many localities. Active work for cost reductions and more load. Very sound financial condition. Capital expenditures contingent largely upon business recovery or proof of net savings.

• Electrical Manufacturers

Steady decrease in business volume since 1929. Dividends, surplus funds

and net worth decreased greatly. Stable price and sales policies maintained. Power and engineering equipment sales at low value, but negotiations on the increase at this time. Merchandising active in creating organization changes and introduction of new policies. More positive co-operation with other industry groups. New markets and new products developed. Courageous attitude and fighting for more business. New sales approach based upon knowledge of buyers' business and problems.

• Jobbers and Dealers

Attention on consumer goods for distribution and sales. Increased diversity in kind of jobbers and dealers handling electrical goods. Better working out of selective selling principle. Specialty distributors' place becoming better defined. Increased attention to getting business in old buildings and plants through modernization and adequacy sales appeals. Manufacturer-jobber-dealer distribution plans and policies still in process of development. Low sales volume in general and precarious financial conditions, but courageous in attitude and willing to co-operate in aggressive selling.

• Trade Associations

General move to restrict trade association activities to service functions for the benefit of the members. All budgets reduced and many activities eliminated. Co-operative developments of sales programs focus interest. Industry disputes giving way to co-operative agreement. Still have code, wiring, quality appliance, inductive co-ordination and other problems for co-operative action. Development of statistical information is rapid and gaining in favor. Possible changes in anti-trust laws may make trade associations more effective.

• Engineering Societies

General reduction in income and budgets. Development of policies toward both professional and economic aids to members and to society. Advent of legislation on licensing introduces major problems as to qualifications for members. New co-operative committees formed to work out future policies. Financial stringency restricting activity in research and support of joint groups, such as the Engineering Council. Mass of membership grumbling somewhat at dues and what they get in return. Definite plans under way to fix policies and solve the problem now confronting the professional societies.

Legislation and Regulation

• State Activities

No further increase in utility anti-merchandising laws anticipated. Engineering licensing laws being strengthened and made more uniform. Upward trend for taxation. Improvement bond issues slow of acceptance. Agitations for rate reductions increase, based upon the fall in commodity prices and purchasing power. Renewed debate on prudent investment, reproduction-new and other theories of valuation. Study of depreciation and surplus. State commissions desire full power over all transactions between operating and holding companies. Several regulatory laws strengthened to increase commission control—some place management functions in hands of commissions. State commissions restricting their control to all aspects involving consumer interest and will concede federal regulation of holding company investor interest. Municipal plant agitation on increase, but improved conditions exist on laws limiting "pay-out-of-savings" plans. State commissions wish control of security issues and management contracts.

• Federal Activities

Federal Power Commission enlarges its powers to supervise entire operations of any utility that has a license under it. End of Federal Trade investigation next year anticipated. Some form of federal regulation of holding companies and interstate power anticipated, but not expected to be onerous. St. Lawrence project promises to hold the political limelight. Plight of the railroads expected to get congressional attention rather than light and power utilities.

Engineering News and Trends

• Power Generation

Under favorable conditions contemplated new fuel-burning stations are expected to produce energy at a total station cost of 3 mills per kilowatt-hour or less at a first cost of from $60 to $80 per kilowatt of capacity. Both 600-lb. and 1,200-lb. installations show favorable operating and economic results. New mercury boiler installations expected to produce energy for under 10,000 B.t.u. per kilowatt-hour at an approximate first cost of about $75 per kilowatt. Increased economic handicap to the building of hydro stations. Use of multiple stations at load centers favored as compared to large stations with transmission. Increased economic advantages for small oil, gas, steam and Diesel stations. Excess utility station capacity about 25 per cent, but recovery of industrial load would reduce this to normal 10 per cent. Explosion and rotary type boilers invented in Europe. Invention of non-inflammable, non-explosive lubricant. Increased use of joint industrial-utility stations. Integral stations with boiler-turbine-generator-transformer used. High-voltage generators available.

• Transmission Trends

Wood-pole, wood-insulation lines prove economic and operating advantages. Reduced economic distance for energy transmission. Installation of lightning-proof lines. Introduction of the insulation co-ordination principle. Stability and regulation problems largely solved by use of fast breakers and accurate relays. High-tension metering troublesome and expensive. Changed ratings for oil breakers proposed. Promising developments in vacuum-tube applications. High-voltage, oil-filled cables successful. Regu-

lation improved by use of synchronous condensers and tap-changing transformers. Improved bushings, breakers, transformers and arresters. Shielding and self-protecting principles introduced. Some very high-voltage lines projected in Europe. Use of sectionalizing principle to eliminate troubles. Increased use of network design. Tie-line load control and system frequency focus interest.

• Metal-Inclosed Substations

Increased trend toward metal-inclosed switchgear. Decrease in use of substations because of use of network principle. Use of semi-portable factory-built substations for both utilities and industrials on the increase. Miniature switchboards and controls favored. New relays and meters introduced. Oil-filled cables often used to replace outdoor buses and connections. Shielding of stations and grading of insulation practiced. Automatic tap-changing transformers with added capacity in emergencies used. Simplification and standardization in design. Switching and metering on low tension favored.

• Distribution Active

Revamping of services and secondaries under way. Increased use of primary and secondary networks. New sequence and outdoor metering favored. Power-factor correction on the increase. Bare wire, cables or improved weatherproof wire favored for overhead distribution. Instantaneous reclosing breakers advocated to improve service. New studies of wood poles and their specifications. Self-protecting transformers introduced. New types of wiring used. Common neutral and grounding of greater importance. Fuses and their application a problem. Use of air breakers increases. Current diversion and demand metering present problems. Improved voltage regulation sought. Economic evaluation of losses desired. Possible elimination of primary cutouts and arresters being studied. Invention of a non-inflammable, non-explosive dielectric. Vertical distribution with multiple substations for high office buildings.

Sales to the Markets

• Merchandising to Homes

Decrease in sales volume of all appliances. Refrigeration sales holding up fairly well. Range compaign successful in preparatory stages. Water heaters in favor. Air conditioning very popular and sales organizations active. Several new sales plans ready for 1933. Many local co-operative sales plans introduced. Decreased consumer buying and less acceptance of time-payment selling. Distribution methods still disorganized, but active plans for improvement under way. New plans for adequate wiring and extension wiring business. Growth of small manufacturers of appliances in market areas. Many problems of policy to be solved. Rental of appliances introduced. Move to regulate appliance quality. Many lower-priced appliances produced. Lower price levels anticipated.

• Power Sales

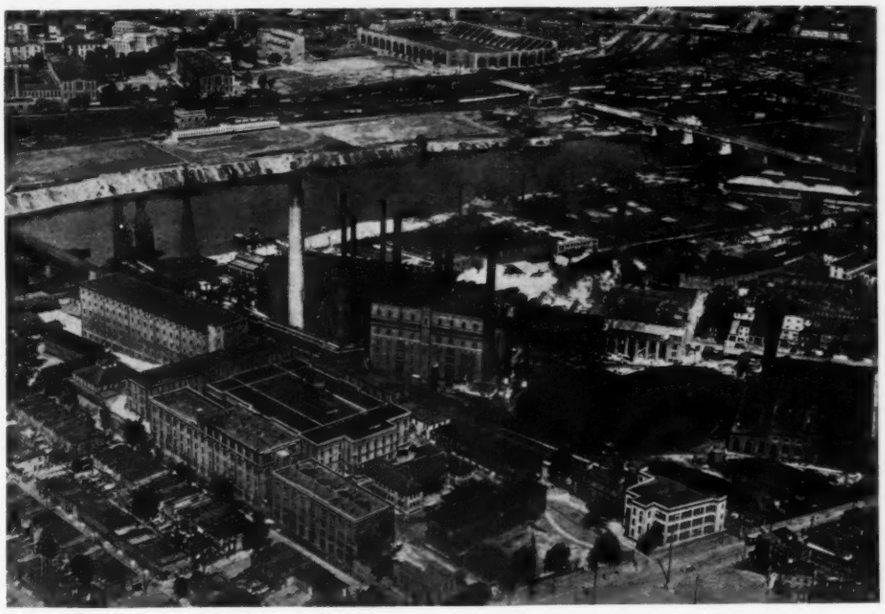
Lightly loaded industries buying power-factor correction equipment. Small industrial heating devices selling well. Electric welding still on the increase. Instruments and controls in demand. Growth of small gas, oil, steam and Diesel installations. Rate and metering problems introduced by high ratio of demand to energy charges for inactive factories. Possibilities of air conditioning for offices and factories very great. Modernization and rehabilitation campaign effective in some instances. Industrial business very spotty and in general still at a low value. Some progress made in joint utility-industrial ties for steam and power. Store and outdoor lighting find markets. Electron tubes and photo-cells increase in use. General expectation for upturn in 1933.

• General and Special Markets

Government releases for public works and public buildings expected in volume next year. Textile, chemical, food, leather and woolen industries quite active. Some business in electrification of steel mill production processes. Pennsylvania electrification and others expected to continue in the near future. New home and industrial lighting campaigns expected to bring results. Consumer goods industries offer best available markets for modernization through electrification. Steady increase in electric steel casting use and in electric furnace and oven applications. Trolley-bus finding favor. Robertson committee stimulates expenditures in capital goods industries. Electric welding finds many new markets. General business level depends upon revival of buying.

We can discern nothing on the horizon that indicates any limitations upon the continued growth and use of electricity; on the contrary, the whole trend of technical development seems to confirm the general impression that electricity is only on the threshold of its real growth and service to man. So far as anything can be certain in an uncertain world, it is that the electrical industry will be a cornerstone of the country's future economic progress, and that what it has been is but a foretaste of what it is to be.

GEORGE B. CORTELYOU.



Courtesy Philadelphia Company

Utilities Improve Operations

UTILITY consolidations and property rearrangements continue to meet the most economical operating and management conditions. Holding company operations are changing toward simplified organizations and decentralization policies. Relief has been had from the pressing burden of maturing securities and bank loans so that capital expenditures may now be made. Although pressure for rate reductions exist and earnings are lower, the general credit and earnings situation is relatively splendid. Reports indicate that delayed maintenance expenditures have reached a critical volume. Utility budgets for this year depend upon load increases very largely. There is decreased utility merchandising and an increase in co-operative merchandising. Competition in industrial power is keener. Technological developments are very active. No serious threats to utility progress and prosperity exist. Utilities support an improved program for state regulation. Federal regulation may be unnecessary in view of state regulation improvement and appears distant as a factual accomplishment.

Sales dominate the situation.
Clear definition of holding and operating company functions needed.
Engineers introduce planning and economies.
Constructive changes in regulation.

Nothing to fear from regulation

These brief statements indicate some of the trends that are now going on in the light and power industry. As usual many problems exist that are difficult of solution, but, on the other hand, opportunities for economies and for business expansion are great, so that, all in all, this is a stable and a very constructive period in utility history. There should be no fear of disaster from radical persecution despite much loose talk, and there is every indication that the industry will be more efficient and more prosperous in the coming years.

Probably the least understood aspect of the utility situation is involved with regulation. Many misconceptions exist as to the potential possibilities of more stringent regulation and the attitude of utilities to these proposals. Very largely utilities approve of the more stringent state regulatory powers that have been proposed by the state commissions; fair but rigid regulation is a protective and not a threatening element of the business. So far as proposals for federal regulation are concerned, they lack definition. Until the improvements in state regulation are had there is no clearly defined reason for instituting federal regulation or even proof that it would be advisable. With respect to federal regulation of interstate power there is little to be said except that the magnitude of the class of business is small and is decreasing. Any attempt to use federal regulation to control holding company securities would encounter many legal and practical difficulties and, even if desirable, this type of regulation appears quite distant and not at all threatening to legitimate enterprises.

Regulation affecting rates and earnings is proving sane and constructive. The commissions are not succumbing to popular clamor or false statements, but are studying facts seriously and are making decisions on a merit basis. In several recent cases of valuation for rate-making purposes it has been shown that "reproduction new," "original cost" and "prudent investment" theories, when applied, achieve about the same total value. From the

standpoint of earnings, therefore, rate cases hold no threat to the utility industry, for now, as before, they earn only a fair return. Full consideration, however, is being given to the recent changes in economic conditions.

Commercial efforts increased

In the commercial aspects of the business there is a noticeable endeavor to develop better and more aggressive selling, especially to the home market. Where utilities cease merchandising, where they merchandise load-building appliances only or where they merchandise all appliances they are striving to get co-operative and aggressive selling by all sales outlets. Several new sales plans have been produced and the achievements in selling electric refrigerators are in view with electric ranges, hot water heaters and air-conditioning equipment. There has grown up a greater spirit of co-operation between all interested in selling and the coming year should witness great progress both in actual sales and in more efficient organizations for selling.

Industrial power sales is in a critical condition despite active work on sales of new business. The competition of small private plants and proposals for small municipal plants is greater and this has been made possible by several parallel developments. Technological progress has made available very efficient small units in Diesel, gas, oil and steam plants, the surplus and low price of oil and coal fuel, the increased volume of natural gas piped to all sections and sold at dump prices, the relative greater proportion of fixed demand charges to energy charges on lightly loaded industrial plants—these influences are creating stiffer competition. In addition, the present price level and dollar level give an economic premium to present expenditures over those made in the past. There is no doubt that major questions of both policy and economics confront the industry with respect to existing and future heavy loads found in industry, in small communities and in hotels and office buildings. Intelligent action, however, will meet this new condition and capitalize upon it.

Organization changes in the industry are largely concerned with a clearer definition of functions and responsibilities and the introduction of operating economies. Holding companies, in general, are decentralizing and placing upon operating managements more power and responsibility. Fees for management and construction are based upon actual costs for actual services instead of fixed annual percentages of gross or net. Affiliated engineering and construction companies are being disbanded steadily and major construction jobs in future will more generally be done under competitive conditions by unaffiliated engineering and consulting firms. A generally favorable reaction is had to developing facts and accounting systems to show actual costs, returns and investments, and these are made public in so far as they are useful to investors, customers and regulatory authorities. Operating and holding company organizations have been combed thoroughly to eliminate waste and unnecessary employees and greatly improved efficiency and economy have been obtained. Many studies and plans of specific organizations have brought practical changes of value. It may be said that the industry organization is far more logical and efficient than ever before.

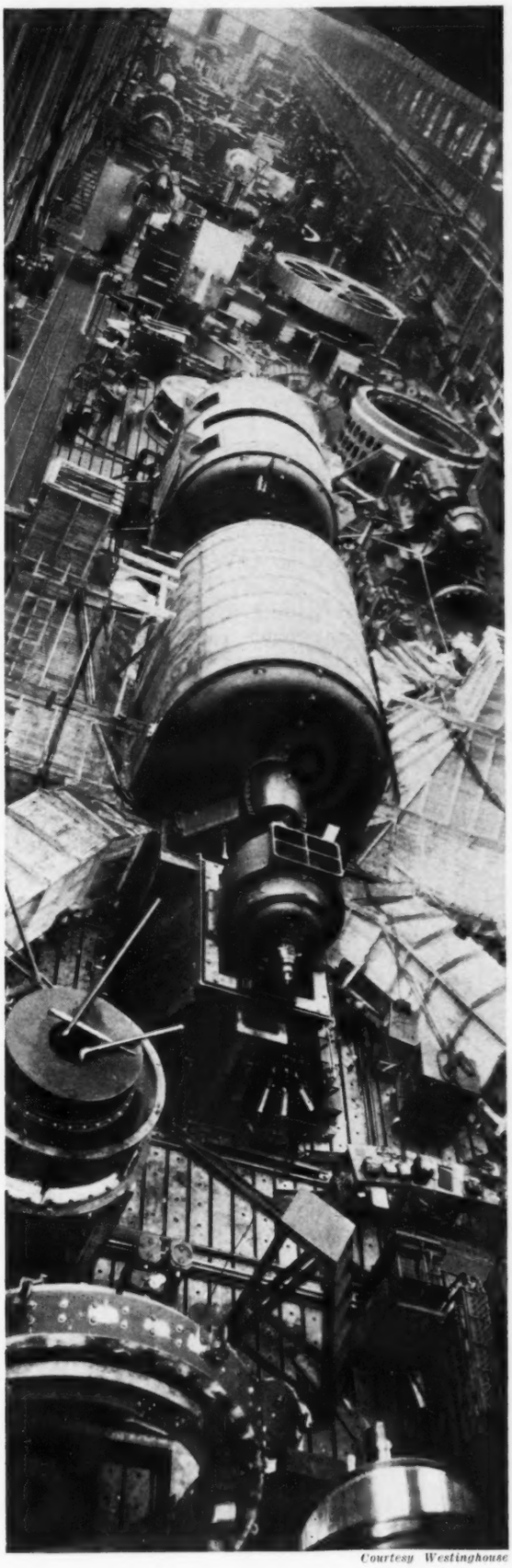
Engineering aspects of the utility business have not changed greatly except as better ideas for system assembly and system layout reduce both investment and operating costs. The network principle has been extended to several voltage levels from the earlier application to distribution circuits only. Steady progress has been made in the use of factory-built unit assemblies for substations and power stations. New ideas for the manufacture and installation of metering and wiring promise to lower costs. Other engineering apparatus has been improved and simplified. In many instances systems have been analyzed from an investment and operating cost point of view by engineers to find where money has been spent, the returns made and the places to spend more money to better advantage. A system assembly using multiple generating stations is proving most economical and both long transmission and hydro generating stations face increased economic handicaps. On the research horizon many improvements and many new equipments promise to make future installations better and less expensive than those already made.

General conditions splendid

On top of the entire utility structure, it may be noted that the credit position, the earnings position and the investor sentiment position are quite good considering the business situation as a whole. The failure of certain top holding companies had less effect on stable enterprises than was anticipated. Some changes in holding company and also operating company financing methods will undoubtedly be made in order to capitalize upon the lessons learned in recent years. But it may be said that considering the very rapid and hit-or-miss growth of the industry it was sounder, more stable and more logically fashioned than its builders visualized in the formative period.

Many difficult problems confront the industry, but their solution is known. Under present economic conditions, however, it is difficult to readjust financial values quickly and there remain many doubts as to the permanency of present levels. Book values in most instances have not been written down to conform to the changed value of the dollar, but many utilities have reduced outstanding securities. There is a decided difference of opinion as to the continued use of the refunding financial principle and as to methods for determining depreciation and surplus funds. New policies on rates and on meeting competition are being studied to get more uniformity, lower prices and more business. A simplification of holding company corporate structures must still be made in some cases and a general stock taking must be made of investment and financial aspects of the business to make them better fitted for present conditions. These changes and studies are under way and, even though some sacrifices may be involved at present, there is no doubt that all of them will be to the ultimate advantage of the industry.

Thus, the light and power industry enters a new year better armed, better organized and better controlled than ever before and has a very promising future to face with quite definite plans for larger and more efficient expansion in its services. It has learned its lessons and applied them quite generally and is in a very favorable situation with respect to both internal and external aspects of the business. In larger measure than any other industry it can go forward independently and without waiting for other national business groups to act. It is planning to do this under leaders who are resourceful and courageous.



Courtesy Westinghouse

Manufacturers Record Deficits

Sales volume decreases steadily — Slight change for the better evident — Statistics on products — Changes in manufacture and organization — Price stability maintained

THE figures on value of electrical manufactured products at factory prices are rather startling. In 1929 the value was $2,200,430,000, in 1931 it was $1,306,850,338 and estimates for 1932 are $806,000,000. These values are based on the census for 1929 and 1931 and reports made directly to ELECTRICAL WORLD of sales made in 1932.

During 1932 the sales of appliances and wiring supplies on the average were 30 per cent of those made in 1931, but the drop in power and industrial electrical equipment sales was nearly 50 per cent. The drop in sales of heavier equipment resulted from a small volume of purchasing from utilities, industrials and public works undertakings. The drop in wiring supplies and appliances resulted from the stagnant home-building program, decreased consumer-purchasing power and, in some measure, from non-aggressive sales efforts.

Preliminary reports of the census show a total value of one classification of electrical machinery, apparatus and supplies manufactured by 1,389 establishments in 1931 as $969,825,713, a decrease of 49.5 per cent as compared with the value of $1,918,733,253 reported in 1929.

The 1931 data do not include manufacturers of radio equipment, electric lighting fixtures or electric signs, nor do they include motor-driven tools, mechanical refrigerators, washing machines, sewing machines and other devices unless the electrical equipment is made by the manufacturers of the devices.

The electric washing machine census for 1931 gives 956,062 machines, valued at $38,236,424, in 1929 and 767,611 machines, valued at $59,930,902, in 1931. Domestic and industrial electric sewing machines aggregated 227,300, valued at $27,625000, in 1929 and 437,000, valued at $13,125,000, in 1931. The value of radio equipment in 1931 was $192,325,171. Lighting equipment was made by 614 establishments to the value of $144,965,706 in 1929, as compared to 503 establishments and a product value of $71,643,552 in 1931.

Thus adding the other electrical products to the main census list the value of electrical products at factory prices aggregated $1,306,850,338 in 1931. Based upon

retail sales price, these products were valued at well over $2,000,000,000. A study of individual items is interesting, showing great decreases and in some cases increases in values, depending upon changes in sales, markets and manufacturing. Data for 1932 are not yet available, but estimates may be made to show that a decrease of about 40 per cent occurred as compared to the business of 1931. A decrease has occurred in practically every type of product, both because of decreased sales volume and lowered costs. Business estimates for 1933 are, in general, based upon a slow up-turn from 1932 magnitudes, but underlying conditions do not permit long-time plans to be made. Business may remain static, it may increase slowly or it may increase very rapidly—it is a guess, and opinion agrees only in fixing 1932 as the valley period of the depression.

Intensive effort at economy

Only a small percentage of electrical manufacture may be classed as necessity business; the remainder is service. luxury or convenience business. Instability and change are inevitable, therefore, and there is a continuous evolution in production, design, marketing and merchandising. Products must be improved continually in mechanical performance, in use value, in eye value and in economic value. Distribution and marketing practices must change to meet changes in consumer demands and competitive sales practices.

Electrical manufacturers have been courageously striving to do business in this period. They have held a solid front on price policies and have maintained their research, development and labor to the utmost possible degree. Yet despite these efforts the financial statements of many electrical manufacturers, shown elsewhere in this issue, indicate a gradual depletion of their resources. Most of them have deficits instead of net profits, and surplus funds, net worth values and working capital resources have slowly decreased.

During this period all manufacturers have watched business and tried to do one or more of the following: Maintain fair prices, reduce manufacturing costs, redesign present products for lower prices or better performance, develop new markets, produce new products for existing markets, increase sales efficiency, improve distribution facilities, eliminate overhead and waste in their organizations. As a result, they are ready to capitalize on a business upturn—they are geared for action. Prospective markets for immediate action are appliances, wiring supplies, air conditioning, traction, industrial rehabilitation, lighting, meters, distribution equipment, industrial control, modernization and maintenance for both utilities and industrials.

Present prospects only fair

Competition is very keen at present, hand-to-mouth buying on a price basis is very noticeable and immediate deliveries are demanded. There has been a growth of reciprocity in business and this is creating changed conditions. Price stability has been well maintained, but it is doubtful if present prices can be maintained in the face of falling commodity prices, buying pressure for lower prices, great savings made in manufacturing and selling and intense competition for every bit of available business. It is to be hoped that only legitimate and sound price reductions will be made, and even these do not seem warranted by the present financial statements of the manufacturers.

Employment in electrical manufacturing has decreased some 30 per cent during 1932 and the average factory load has been reduced to some 20 per cent of capacity. Engineering and research have suffered least from the necessity to curtail forces and every effort has been made to help out productive workers by staggering work and by retaining workers as long as possible.

Every manufacturer has looked at his balance sheet and reduced operating expenses. Some have maintained a normal sales organization and gone after business, but it has been impossible to create business volume as a whole. Careful checks of all operations have been made, systematic market analyses have been made, and organizations have been simplified and modernized. Electrical manufacturers still have courage and confidence and will use every effort to get sales during the coming year.

▼

German Trend Toward Public Utility Power

Public utility plants in Germany have been increasing in aggregate capacity much more rapidly than those operated privately by industries. Whereas the former gained 68 per cent from 1925 to 1929, the latter added only 12 per cent. More recent data for industrial plants are not available. The following table shows the difference in yearly growth:

Installed Generator Capacity

(Thousands of Kw.)

Year	Public Utility	Private	Total
1925	4,458	4,395	8,853
1926	5,171	4,384	9,555
1927	5,728	4,515	10,243
1928	6,297	4,805	11,102
1929	7,495	4,921	12,416

That the private industrial plants operate at a decidedly better capacity factor than the public utilities is apparent from output figures. In 1929, for example, the public utility plants produced 16,391,000,000 kw.-hr., the industrials 14,199,000,000 kw.-hr., and other private plants 70,000,000 kw.-hr., making a total of 30,660,000,000 kw.-hr.

Another table, also quoted in a report to the Department of Commerce and presumably also from official sources, shows the effect of economic conditions on the utilization of existing central station capacity. The reason for the slight descrepancy between the two tables is not stated.

Capacity and Output of Central Stations

Year	Installed Capacity, (000) Kw.	Production (000,000), Kw.-hr.	Capacity Utilization, Per Cent
1926	5,110	9,952	22.3
1927	5,776	12,444	24.6
1928	6,496	14,479	25.4
1929	7,549	16,613	25.1
1930	8,110	16,306	22.9

Outstanding Facts

Figures (*except as noted*) are on electric light and power industry for the year's operations or as of the end of each year.

	1917	1922	1927	1928	1929	1930	1931	[1]1932
CAPITAL invested ($1,000)	3,245,185	4,817,000	9,500,000	10,300,000	11,100,000	11,800,000	12,400,000	12,600,000
Securities sold ($1,000)	.....	719,961	2,152,527	1,653,180	1,468,895	1,591,986	1,491,742	465,921
By investment houses ($1,000)	.....	589,961	[3]1,889,000	[3]1,471,498	[3]1,315,459	[3]1,452,854	[3]1,341,742	[3]447,921
Direct to customers ($1,000)	.....	130,000	263,527	181,682	153,436	139,132	150,000	18,000
REVENUE, total gross ($1,000)	526,894	1,072,120	1,963,664	.....	.....	.....	.....	.....
For electric service ($1,000)	[4]502,060	[4]1,020,439	1,802,655	1,941,955	2,105,900	2,151,150	2,125,110	1,979,240
Domestic ($1,000)	402,263	842,566	523,689	571,620	618,799	664,441	678,611	670,200
Small light and power ($1,000)			482,136	519,957	555,640	575,598	564,524	527,400
Large light and power ($1,000)			519,074	549,989	613,171	590,992	570,127	474,800
Municipal ltg. and misc. ($1,000)	36,652	49,151	82,996	90,695	98,646	107,841	114,045	114,000
Railroads and railways ($1,000)	53,524	48,444	53,137	52,048	52,264	52,083	48,637	43,900
Other utilities ($1,000)		75,011	141,623	157,646	167,380	160,195	149,166	148,940
From other sources ($1,000)	24,834	51,681	161,009	.....	.....	.....	.....	.....
EXPENDITURES								
Additions and extensions ($1,000)	.....	324,016	760,353	786,977	866,344	960,190	633,415	260,000
Operating, total[2] ($1,000)	284,701	553,068	828,168	866,350	934,890	946,180	913,910	839,630
Salaries, average ($ per year)	902	1,409	1,561	.....	.....	.....	.....	.....
Officers	2,211	3,287						
Superintendents and managers	1,662	2,415	[7]1,735	.....	.....	.....	.....	.....
Clerks	825	1,344						
Wage earners	833	1,312	[7]1,450	.....	.....	.....	.....	.....
ENERGY (1,000,000 kw.-hr.)								
Output, all public utilities	.....	47,659	80,205	87,850	97,352	95,936	91,729	82,966
Output, central stations only	25,438	43,560	74,686	82,927	91,421	89,952	86,312	77,514
From fuel	.....	26,573	45,968	49,419	59,031	59,388	57,742	45,916
From water power	.....	16,987	28,718	33,508	32,390	30,562	28,570	31,598
Total; incl. imported and purchased	26,663	44,422	76,369	83,394	92,757	91,957	88,400	79,300
SYSTEMS, STATIONS								
Number of establishments	6,542	6,355	4,355	4,063	[8]2,801	[8]2,755	[8]2,596	[8]2,486
Commercial establishments	4,224	3,774	2,137	2,153	[8]1,480	[8]1,379	[8]1,308	[8]1,214
Municipal establishments	2,318	2,581	2,198	1,910	[8]1,321	[8]1,376	[8]1,288	[8]1,272
Companies generating	5,124	4,389	2,331	2,394	[8]1,699	[8]1,575	[8]1,686	[8]1,636
purchasing all energy	1,418	1,966	2,004	1,669	[8]1,102	[8]1,180	[8]910	[8]850
No. 100,000,000 kw.-hr. systems	.....	6	124	135	137	142	142	.....
Transmission (circuit miles)	.....	86,290	185,449	[9]173,797	[9]184,931	[9]200,171	[9]211,361	[9]213,300
Generating plants, all central station	6,542	5,444	4,801	4,352	4,250	3,873	[8]2,635	3,710
Commercial	4,224	3,615	3,589	3,232	3,190	2,863	.....	.....
Municipal	2,318	1,820	1,207	1,120	1,060	1,010	.....	.....
RATINGS								
Generator rating (kw.)	8,994,407	14,313,438	25,811,305	27,698,305	29,558,637	31,976,138	33,483,821	33,977,800
Prime movers (hp.)	12,936,755	20,296,235	35,710,128	38,544,800	41,551,800	44,747,000	47,112,000	47,851,000
Steam engines and turbines (hp.)	8,449,076	14,171,222	25,317,577	27,360,000	29,512,000	31,540,000	32,250,000	32,880,000
Water wheels (hp.)	4,277,273	5,822,018	9,844,263	11,119,800	11,439,000	12,540,000	14,155,000	14,251,000
Internal combustion engines (hp.)	210,406	302,995	548,288	575,000	600,000	667,000	707,000	720,000
Water power, all uses (hp.)	6,800,000	8,270,000	12,296,000	13,571,530	13,807,778	14,884,667	15,562,805	15,834,465
FUEL CONSUMPTION								
Coal and coke (short tons)	21,565,273	26,130,865	37,500,630	37,593,322	41,406,000	39,702,000	35,690,336	27,700,000
Oil (bbl.)	6,158,219	11,855,969	7,145,798	6,852,352	9,740,000	8,950,000	7,898,629	7,500,000
Gas (1,000 cu.ft.)	14,199,204	20,174,385	65,522,792	77,054,261	112,442,000	119,457,000	138,482,537	107,200,000
ENERGY DISPOSITION (1,000,000 kw.-hr.)								
Sales, domestic	4,530	9,560	7,676	8,619	9,773	11,018	11,738	11,970
Small power and light			10,766	11,692	13,106	13,944	13,544	12,900
Large power and light	12,560	20,620	35,263	38,903	44,326	41,621	38,451	31,000
Municipal lighting and misc.	([6])	([6])	2,003	2,223	2,450	2,735	2,994	2,950
Railways and railroads	4,400	5,642	5,543	5,551	5,640	5,588	5,175	4,690
Company railway depts.	.....	.....	1,348	1,330	1,279	1,184	970	880
Company use and losses	5,140	8,600	13,770	15,077	16,184	15,867	15,528	14,920
CUSTOMERS AND EMPLOYEES								
Customers, total	7,178,703	12,709,868	21,786,212	23,153,252	24,147,183	24,555,732	24,489,770	24,227,379
Domestic lighting	5,810,300	10,211,232	17,950,934	19,089,882	19,967,154	20,331,551	20,151,247	19,908,513
Commercial lighting	1,125,200	2,030,324	3,358,140	3,532,489	3,598,115	3,628,653	3,724,013	3,696,053
Industrial power and other	243,203	468,312	477,138	530,881	581,914	595,528	614,510	622,813
People in electric lighted homes	25,250,000	43,100,000	75,500,000	80,300,000	84,000,000	84,700,000	85,500,000	85,000,000
Per cent of total population	24.3	38.9	63.0	67.5	70.0	70.0	70.0	70.0
Employees, total	105,541	150,762	251,020	†265,000	†289,000	†298,000	†262,000	†232,000

† Estimated.
[1] Estimated, generally on ten months' operations.
[2] Does not include interest, taxes, depreciation, or sinking fund.
[3] Includes rights.
[4] Includes estimated value of free service, not tabulated below.
[6] Included in "lighting."
[7] Commercial companies only
[8] Very small ones omitted.
[9] 11,000 volts or over.

Utility Revenue Holds Up

Courtesy Union Electric Light & Power

TOTAL REVENUE of utilities in 1932 amounted to $1,979,200,000, compared with $2,125,100,000 in 1931—a decrease of 6.85 per cent. This is a remarkable showing and shows the stability of the industry in the worst year of the depression. Compared to the peak year of 1930 revenues have decreased only 8.0 per cent.

DOMESTIC REVENUE decreased only $9,000,000 in 1932 and aggregated $670,000,000. Retail light and power decreased $37,000,000 and aggregated $527,000,000. As was to be expected, wholesale revenue decreased $100,000,000 and totaled only $474,000,000. Thus about $100,000,000 of the total $146,000,000 decrease in revenue in 1932 is accounted for by lightly loaded industrial plants.

DESPITE RATE DECREASES in the domestic business the influence of merchandise sales and inducement rates has enabled the industry to maintain an income from the domestic business in excess of any year except 1931. Domestic consumers are finding their purchasing power increased by changes in dollar value and are buying more electric service for home use and convenience despite the keener competition for their money by other industries.

A GLANCE at the chart on the opposite page shows vividly what may be expected with a return of normal industrial load. As in 1921, this sharp drop in this class of business may be expected to be overcome with business recovery and expansion will follow the trend line of revenue growth. Recovery of general industry will also reflect itself in increased revenue from domestic and retail customers.

ALL REGIONS show stability in revenue, but those having large industrial loads show the maximum decreases. New England shows a very stable income condition with only a $6,000,000 decrease in a revenue of $184,000,000 despite the fact that it is an industrial area.

Domestic Customers Provide About One-third of Revenue Retail and Wholesale Customers About One-quarter Each

(Expressed in $1,000,000)

Year	1926	1927	1928	1929	1930	1931	1932
Total	**1,622**	**1,803**	**1,942**	**2,106**	**2,151**	**2,125**	**1,979**
Total ultimate consumers	1,520	1,661	1,784	1,939	1,991	1,976	1,830
Domestic	478	524	572	619	664	679	670
Retail light and power	427	482	520	556	576	564	527
Wholesale light and power	489	519	550	613	591	570	475
Municipal and miscellaneous	74	83	90	90	108	114	114
Railway and railroads	52	53	52	52	52	49	44
Other sources*	102	142	158	167	160	149	149

*Company-owned railway departments, sales to other public utilities for resale, etc.

Middle Atlantic and E. N. Central States Contribute Major Revenues

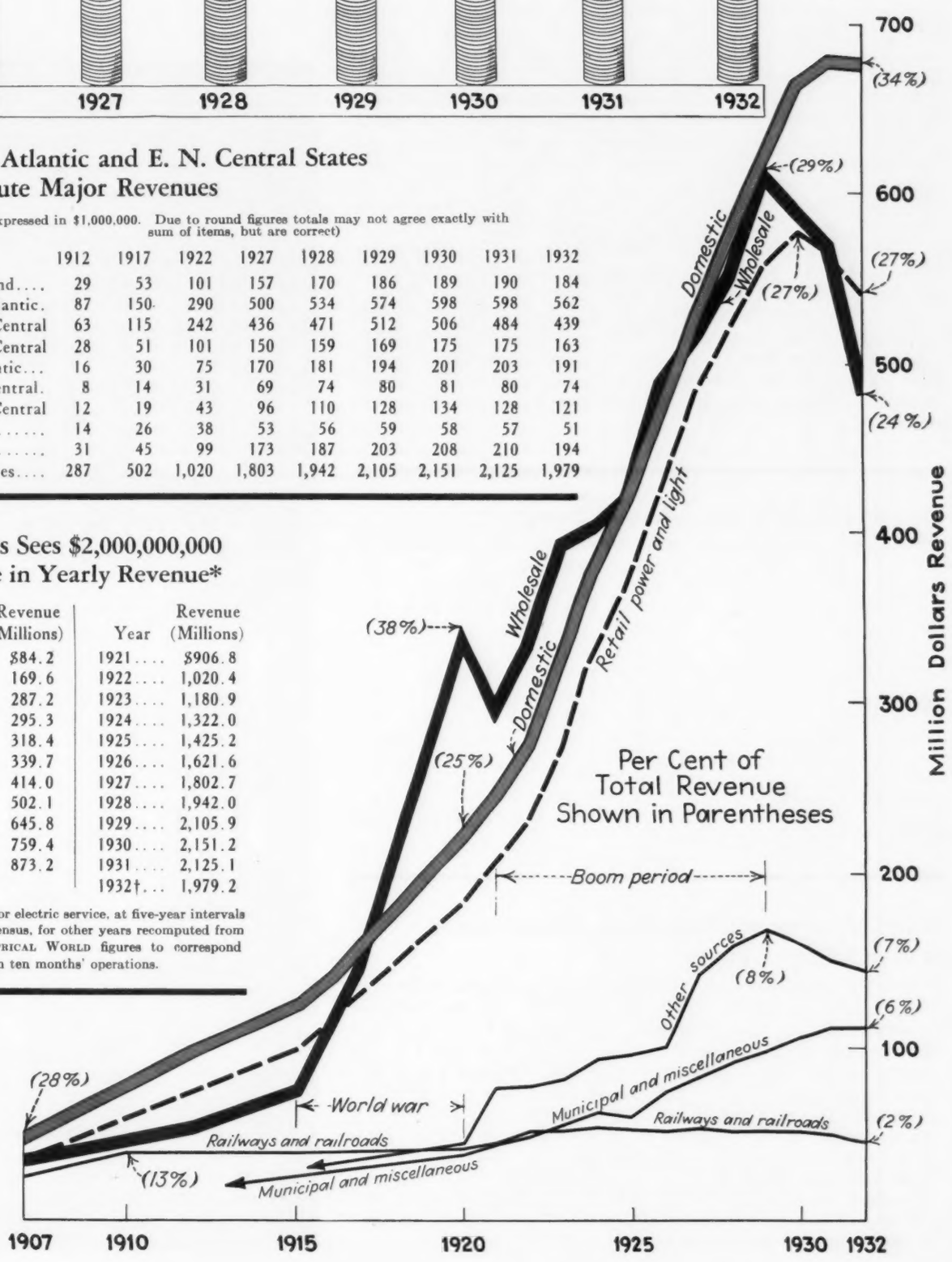
(Expressed in $1,000,000. Due to round figures totals may not agree exactly with sum of items, but are correct)

	1912	1917	1922	1927	1928	1929	1930	1931	1932
New England....	29	53	101	157	170	186	189	190	184
Middle Atlantic.	87	150	290	500	534	574	598	598	562
E. North Central	63	115	242	436	471	512	506	484	439
W. North Central	28	51	101	150	159	169	175	175	163
South Atlantic...	16	30	75	170	181	194	201	203	191
E. South Central.	8	14	31	69	74	80	81	80	74
W. South Central	12	19	43	96	110	128	134	128	121
Mountain.....	14	26	38	53	56	59	58	57	51
Pacific.....	31	45	99	173	187	203	208	210	194
United States....	287	502	1,020	1,803	1,942	2,105	2,151	2,125	1,979

30 Years Sees $2,000,000,000 Increase in Yearly Revenue*

Year	Revenue (Millions)	Year	Revenue (Millions)
1902.....	$84.2	1921....	$906.8
1907.....	169.6	1922....	1,020.4
1912.....	287.2	1923....	1,180.9
1913.....	295.3	1924....	1,322.0
1914.....	318.4	1925....	1,425.2
1915.....	339.7	1926....	1,621.6
1916.....	414.0	1927....	1,802.7
1917.....	502.1	1928....	1,942.0
1918.....	645.8	1929....	2,105.9
1919.....	759.4	1930....	2,151.2
1920 ...	873.2	1931....	2,125.1
		1932†...	1,979.2

*Revenue for electric service, at five-year intervals from U. S. Census, for other years recomputed from earlier ELECTRICAL WORLD figures to correspond
†Estimated on ten months' operations.



Energy Generated Totals 77.5 Billion Kw.-Hr.

ENERGY generated in 1932 by electric light and power stations was 77,500,000,000 kw.-hr., a decrease of 12.5 per cent from the 86,300,000,000 kw.-hr. generated in 1931. About one-half the total energy was generated in the Middle Atlantic and East North Central states. Fuel-burning stations produced about 60 per cent of the energy and hydro stations 40 per cent. The Pacific states lead in water-power generation and the West South Central states in fuel-burning station generation.

Energy sold totaled 63,500,000,000 kw.-hr., giving 16 per cent of the generated energy as now revenue producing. Wholesale and retail power accounted for sales of 44,000,000,000 kw.-hr., domestic sales for 12,000,000,000 kw.-hr. and the remainder was sold for miscellaneous services. While a decrease in energy sales is found in every class of business, the domestic and retail power sales maintained their magnitudes in greater degree than wholesale power. Each geographical area had a decrease in energy generation.

Distribution of Central-Station Energy

(Billion Kilowatt-Hours. Omission of final figures makes some totals fail to check exactly.)

	1926	1927	1928	1929	1930	1931	1932*
Generated	69.2	74.7	82.9	91.4	90.0	86.3	77.5
Total, including other sources.	70.5	76.4	83.4	92.8	92.0	88.4	79.3
Electric railway departments.	1.5	1.3	1.3	1.3	1.2	1.0	0.9
Other company use	1.0	1.1	1.2	1.2	1.3	1.3	1.2
Distributed	67.9	73.9	80.8	90.3	89.5	86.1	77.2
Total sold	56.1	61.3	67.0	75.3	75.0	71.9	63.5
Wholesale power	32.6	35.3	38.9	44.3	41.6	38.5	31.0
Retail light and power	9.5	10.8	11.7	13.1	13.9	13.5	12.9
Domestic	6.8	7.7	8.6	9.8	11.0	11.7	12.0
Railway and electric railroads	5.4	5.5	5.6	5.6	5.6	5.2	4.7
Municipal and miscellaneous..	1.8	2.0	2.2	2.5	2.7	3.0	2.9
Losses	11.8	12.7	13.8	15.0	14.6	14.2	13.7

* Estimate based on ten months' operations.

Middle Atlantic and East North Central States Lead in Energy Output

Billion Kilowatt-Hours. Omission of final figures makes some totals fail to check exactly.)

	1912	1917	1922	1927	1928	1929	1930	1931	1932*
United States	11.6	25.4	43.6	74.7	82.9	91.4	90.0	86.3	77.5
New England	0.9	1.8	3.3	4.8	5.4	6.0	5.8	5.9	5.2
Middle Atlantic	3.5	7.7	11.0	19.3	20.0	21.6	22.0	21.4	19.7
East North Central	2.5	5.8	10.2	18.2	20.5	22.8	21.6	20.2	17.9
West North Central	0.7	1.8	3.2	4.5	4.8	5.4	5.7	5.7	5.3
South Atlantic	0.7	1.7	4.7	8.4	10.4	11.8	10.8	10.1	9.0
East South Central	0.2	1.0	1.5	2.8	3.1	3.4	3.5	3.6	3.3
West South Central	0.2	0.5	1.3	3.3	4.0	4.9	5.0	4.5	4.0
Mountain	0.8	2.0	2.3	3.4	3.7	3.8	3.5	3.1	2.3
Pacific	1.9	3.1	6.1	10.0	11.0	11.8	11.9	12.0	10.7

* Estimate based on ten months' operations.

Energy Generated in Light and Power Plants*

West South Central Leads in per Cent Fuel Generation, Pacific in per Cent Water Power. For all utility energy see table below.

Region	1930 Millions of Kw.-Hr. Total	1930 Millions of Kw.-Hr. Hydro	1930 Millions of Kw.-Hr. Fuel	1930 Per Cent Hydro	1930 Per Cent Fuel	1931 Millions of Kw.-Hr. Total	1931 Millions of Kw.-Hr. Hydro	1931 Millions of Kw.-Hr. Fuel	1931 Per Cent Hydro	1931 Per Cent Fuel	1932† Millions of Kw.-Hr. Total	1932† Millions of Kw.-Hr. Hydro	1932† Millions of Kw.-Hr. Fuel	1932† Per Cent Hydro	1932† Per Cent Fuel
United States	89,950	30,562	59,388	34.0	66.0	86,312	28,570	57,742	33.1	66.9	78,593	31,014	47,579	39.5	60.5
New England	5,832	2,074	3,758	35.6	64.4	5,856	2,442	3,414	41.8	58.2	5,296	2,641	2,655	49.9	50.1
Middle Atlantic	22,003	5,408	16,595	24.6	75.4	21,361	5,217	16,144	24.5	75.5	19,901	5,660	14,241	28.4	71.6
East North Central	21,622	1,907	19,715	8.8	91.2	20,231	1,782	18,449	8.8	91.2	18,163	2,154	16,009	11.9	88.1
West North Central	5,739	1,333	4,406	23.2	76.8	5,671	1,272	4,399	22.4	77.6	5,434	1,626	3,808	29.9	70.1
South Atlantic	10,750	5,098	5,652	47.4	52.6	10,064	4,834	5,230	48.1	51.9	9,205	5,097	4,108	55.4	44.6
East South Central	3,546	2,682	864	75.6	24.4	3,553	2,759	794	77.7	22.3	3,319	2,675	644	80.6	19.4
West South Central	5,047	66	4,981	1.3	98.7	4,477	77	4,400	1.7	98.3	4,099	154	3,945	3.8	96.2
Mountain	3,496	2,862	634	81.9	18.1	3,077	2,289	788	74.3	25.7	2,404	1,811	593	75.3	24.7
Pacific	11,915	9,132	2,783	76.6	23.4	12,022	7,898	4,124	65.7	34.3	10,772	9,196	1,576	85.3	14.7

*By courtesy of the United States Geological Survey, with deductions for plants not considered light and power enterprises. †Twelve months ended Oct. 31

Water-power generation increased greatly in 1932, its percentage of the total generation going from 33 in 1931 to 40 in 1932. Rainfall was plentiful in all areas and this was reflected in a greater use of hydro stations. New England generated 50 per cent from hydro and 50 per cent from fuel. The South Atlantic used more water than fuel in 1932 and reversed its 1931 generation in this respect. Oil and gas are gaining in use also because of their low price and more general availability for power-station use. The general good supply of water undoubtedly reflected itself in fuel and labor savings in 1932.

Total and Fuel-Generated Energy With Coal Consumption and Economy

Including electric light and power, electric railway, Bureau of Reclamation and certain other plants generating energy for public consumption. (U. S. Geological Survey.) For light and power plants only see table above.

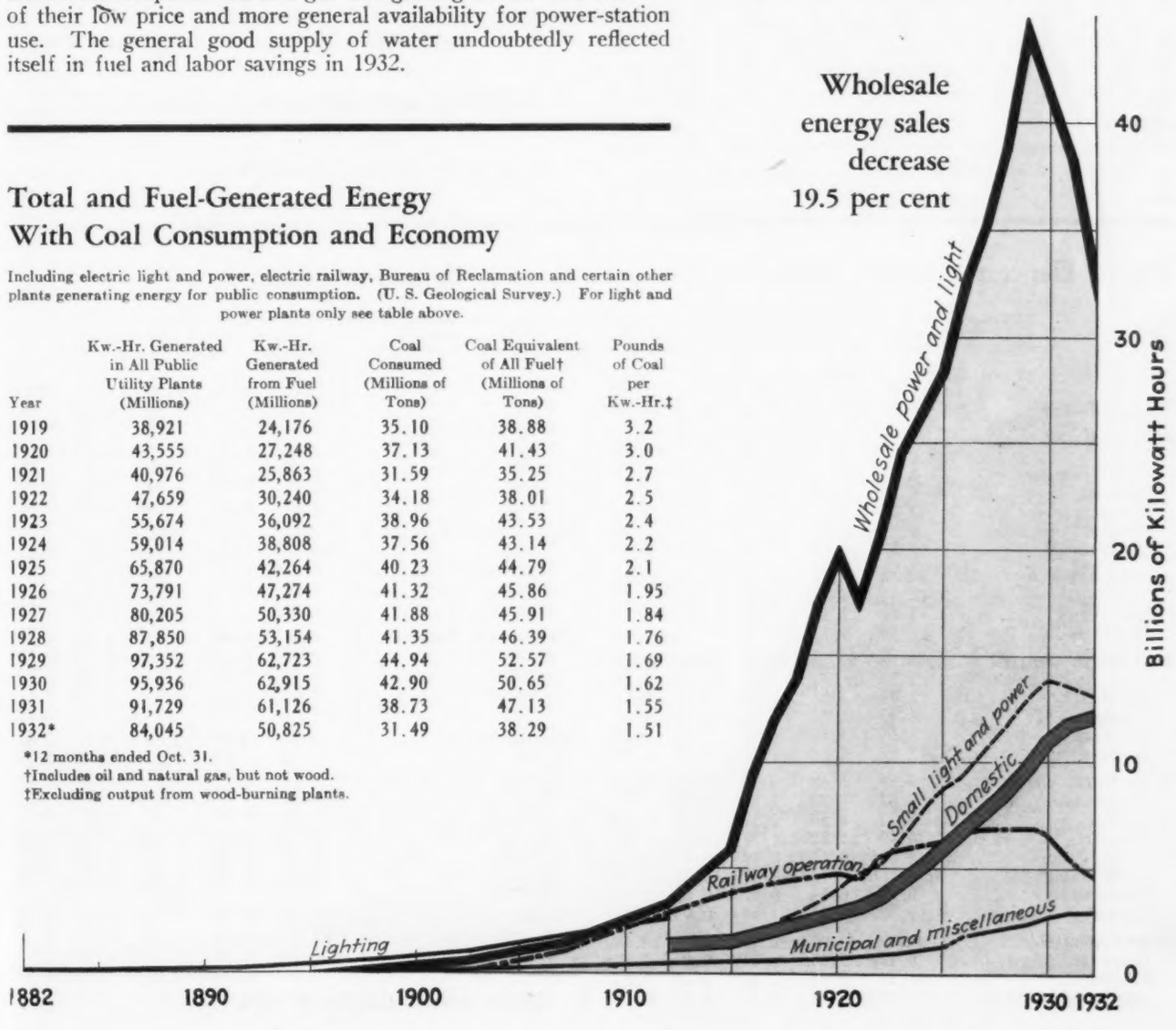
Year	Kw.-Hr. Generated in All Public Utility Plants (Millions)	Kw.-Hr. Generated from Fuel (Millions)	Coal Consumed (Millions of Tons)	Coal Equivalent of All Fuel† (Millions of Tons)	Pounds of Coal per Kw.-Hr.‡
1919	38,921	24,176	35.10	38.88	3.2
1920	43,555	27,248	37.13	41.43	3.0
1921	40,976	25,863	31.59	35.25	2.7
1922	47,659	30,240	34.18	38.01	2.5
1923	55,674	36,092	38.96	43.53	2.4
1924	59,014	38,808	37.56	43.14	2.2
1925	65,870	42,264	40.23	44.79	2.1
1926	73,791	47,274	41.32	45.86	1.95
1927	80,205	50,330	41.88	45.91	1.84
1928	87,850	53,154	41.35	46.39	1.76
1929	97,352	62,723	44.94	52.57	1.69
1930	95,936	62,915	42.90	50.65	1.62
1931	91,729	61,126	38.73	47.13	1.55
1932*	84,045	50,825	31.49	38.29	1.51

*12 months ended Oct. 31.
†Includes oil and natural gas, but not wood.
‡Excluding output from wood-burning plants.

1932 generation decreased 12.5 per cent

Water power produced 40 per cent of the energy

Wholesale energy sales decrease 19.5 per cent



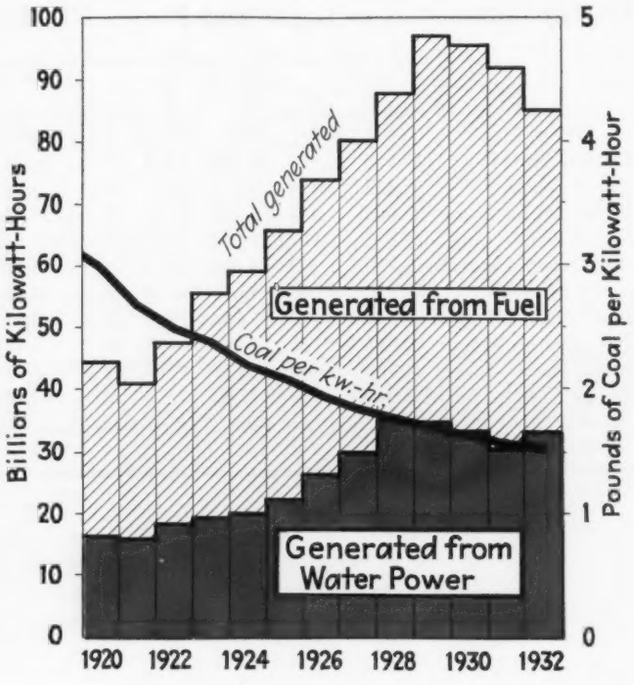
From Small Beginning to 90,000,000,000 Kw.-Hr. in Half a Century

(Central stations only. Billion Kilowatt-Hours)

Year		Year		Year	
1882	Small	1915	16.2	1924	54.4
1887	0.175	1916	21.2	1925	61.2
1892	0.3	1917	25.4	1926	69.2
1897	0.8	1918	29.2	1927	74.7
1902	2.3	1919	34.9	1928	82.9
1907	5.9	1920	39.5	1929	91.4
1912	11.6	1921	37.0	1930	90.0
1913	13.0	1922	43.6	1931	86.3
1914	14.4	1923	51.1	1932	77.5

New developments in generation are continuing. Two new mercury-turbine installations are being made in this country. Two new types of boilers have been developed in Europe. Experimental installations using higher pressures and temperatures give promise of practical application. Continued cost reductions are made possible in stations by better design assemblies and the use of large high-rated unit shipments. An intensive study of operating economies has been made, with a resultant improvement in economic operation.

New installations for energy generation continue to be made at the rate of about 700,000 kw. a year and the promised early completion of Hoover Dam and the St. Lawrence will introduce a very large increment of new water power. In general, however, new installations are being made in relatively small stations located at the loads and in extensions to existing stations.



Middle Atlantic States lead in generation

Increased economy from fuel use

A good year for water power

Energy Generated in All Classes of Electric Utilities by Region and State

Expressed in billion kilowatt-hours. Includes electric light and power, railway and other utilities. Figures are condensed from U. S. Geological Survey. Slight discrepancies between group totals and the sum of component items arise from contractions to eliminate final digits in the original data.

	1928	1929	1930	1931	1932*
United States	**87.85**	**97.35**	**95.94**	**91.72**	**84.04**
New England	**5.96**	**6.61**	**6.40**	**6.39**	5.78
Maine	0.69	0.72	0.73	0.84	0.78
New Hampshire	0.30	0.31	0.37	0.59	0.69
Vermont	0.45	0.46	0.48	0.46	0.50
Massachusetts	2.75	3.03	2.91	2.74	2.48
Rhode Island	0.49	0.65	0.55	0.44	0.28
Connecticut	1.27	1.44	1.37	1.31	1.05
Middle Atlantic	**22.66**	**24.78**	**25.14**	**24.40**	**22.92**
New York	13.03	14.47	14.40	13.84	13.27
New Jersey	2.09	2.16	2.86	3.31	3.16
Pennsylvania	7.54	8.15	7.87	7.25	6.49
East North Central	**20.95**	**23.33**	**22.16**	**20.64**	**18.47**
Ohio	5.54	6.42	5.94	5.56	5.06
Indiana	1.99	2.58	2.94	2.88	2.56
Illinois	6.97	7.37	6.85	6.33	5.45
Michigan	4.35	4.70	4.27	3.89	3.50
Wisconsin	2.11	2.28	2.16	1.98	1.90
West North Central	**5.13**	**5.68**	**5.98**	**5.88**	**5.65**
Minnesota	1.07	1.20	1.31	1.30	1.13
Iowa	1.52	1.50	1.57	1.50	1.59
Missouri	0.99	1.22	1.27	1.31	1.27
North Dakota	0.085	0.105	0.125	0.137	0.137
South Dakota	0.106	0.108	0.114	0.102	0.090
Nebraska	0.46	0.53	0.57	0.60	0.56
Kansas	0.89	1.01	1.01	0.93	0.87
South Atlantic	**10.50**	**11.90**	**10.89**	**10.20**	**9.38**
Delaware	0.100	0.053	0.018	0.005	0.005
Maryland	1.48	2.01	1.87	1.70	1.63
District of Columbia	0.47	0.51	0.55	0.58	0.60
Virginia	1.17	1.30	1.23	1.13	1.05
West Virginia	2.04	2.22	2.10	1.92	1.57
North Carolina	2.23	2.55	2.30	2.00	1.67
South Carolina	1.40	1.46	1.20	1.37	1.29
Georgia	0.98	1.14	0.94	0.84	0.95
Florida	0.64	0.67	0.69	0.65	0.61
East South Central	**3.33**	**3.62**	**3.88**	**3.91**	**3.55**
Kentucky	0.63	0.72	0.72	0.75	0.67
Tennessee	0.96	1.02	1.04	1.12	1.06
Alabama	1.69	1.83	2.06	1.98	1.77
Mississippi	0.050	0.057	0.062	0.053	0.052
West South Central	**4.04**	**4.90**	**5.05**	**4.50**	**4.10**
Arkansas	0.150	0.128	0.108	0.105	0.159
Louisiana	0.82	0.99	1.07	1.08	0.96
Oklahoma	0.84	0.98	0.96	0.78	0.73
Texas	2.22	2.80	2.92	2.53	2.25
Mountain	**3.92**	**3.97**	**3.70**	**3.27**	**2.64**
Montana	1.62	1.61	1.32	0.97	0.69
Idaho	0.95	0.89	0.91	0.80	0.58
Wyoming	0.084	0.099	0.098	0.095	0.085
Colorado	0.54	0.56	0.57	0.53	0.50
New Mexico	0.052	0.067	0.076	0.180	0.160
Arizona	0.34	0.28	0.38	0.40	0.29
Utah	0.28	0.40	0.29	0.28	0.30
Nevada	0.055	0.044	0.043	0.019	0.032
Pacific	**11.38**	**12.56**	**12.72**	**12.55**	**11.55**
Washington	2.36	2.55	2.56	2.57	2.53
Oregon	1.04	1.16	1.22	1.18	0.98
California	7.98	8.85	8.95	8.80	8.04

*Twelve months ended Oct. 31, 1932.

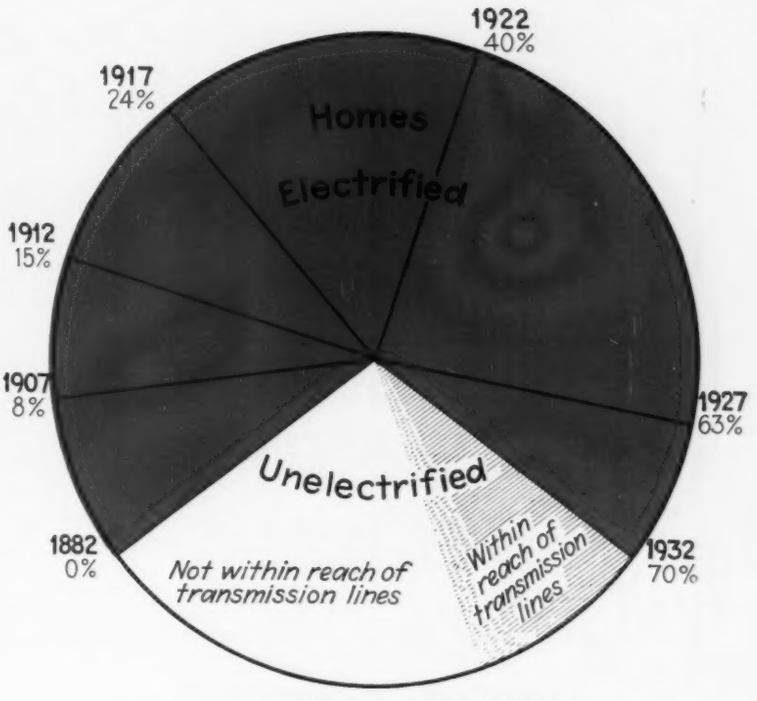
Customers Aggregate 24,187,151

LIGHT and power customers have been affected by the depression. The total number decreased 302,619 in 1932, but this is only slightly more than 1 per cent. Considering unemployment, cessation of building and an inactive industry, this is a remarkable record. Domestic customers decreased 276,734 and commercial lighting and small power customers decreased 33,729. Wholesale power and miscellaneous customers increased 7,844, showing positive results of utility sales efforts. New England, Middle Atlantic and West North Central regions have been most stable as to customers and this fact checks with other business facts about these regions.

Opportunity for additional business lies in increased use by present customers rather than in getting more customers. In urban communities saturation is high. Progress in rural areas brought a net increase of several thousand even under 1932 conditions.

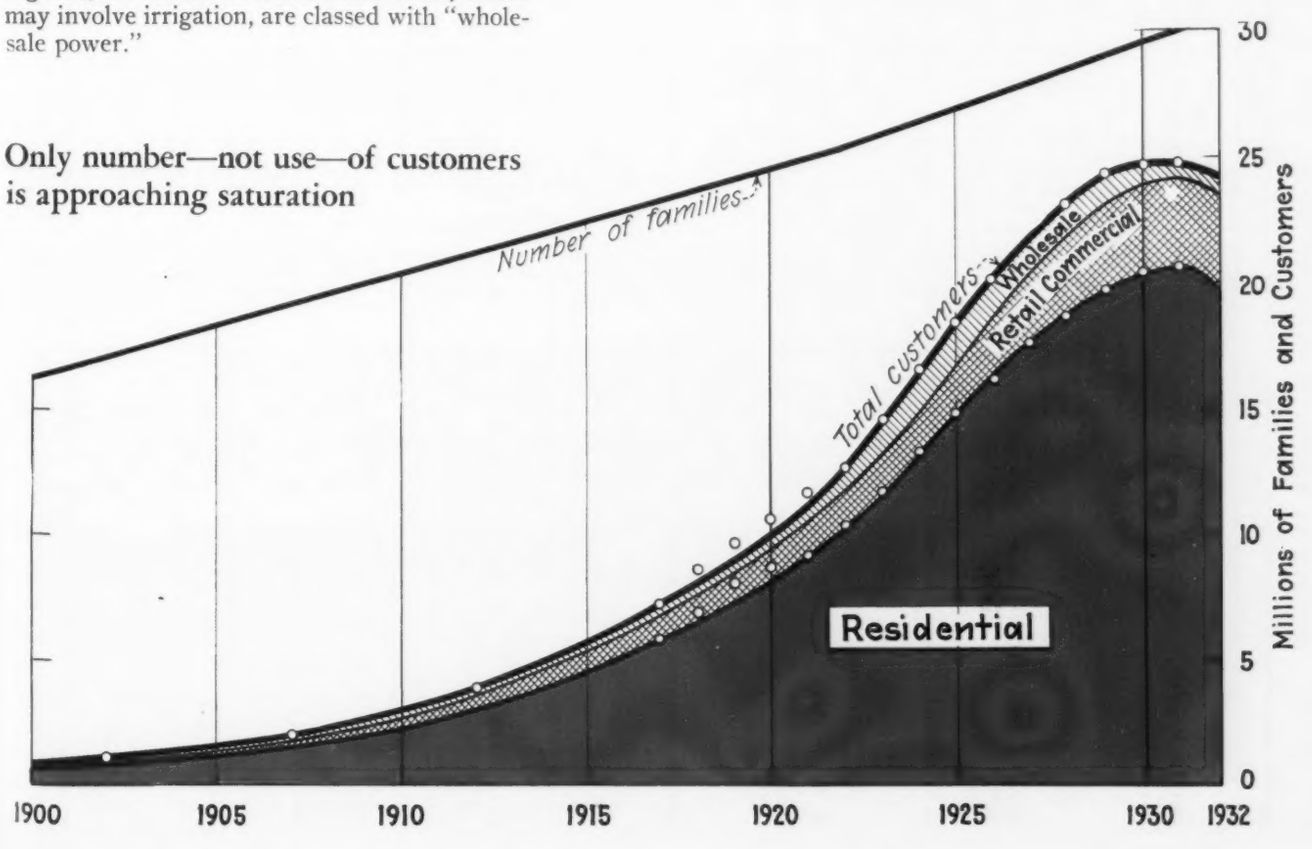
Owing to reclassifications in 1931 the data for 1930 are not strictly comparable with those for later years. Data in the table are as of October 1. Later information shows an increase during that month of 40,000.

Of the 706,464 farm customers about 500,000 are included in "domestic." The remaining 200,000 in the Southwest and West, which may involve irrigation, are classed with "wholesale power."



Unserved homes are chiefly in sparsely settled districts

Only number—not use—of customers is approaching saturation



Central-Station Customers

	Total Number				Domestic Service†				Commercial Lighting and Small Power				Wholesale Power and Miscellaneous			
	1930*	1931	1932‡	Increase in 1932	1930*	1931	1932‡	Increase in 1932	1930*	1931	1932‡	Increase in 1932	1930*	1931	1932‡	Increase in 1932
UNITED STATES	**24,555,732**	**24,489,770**	**24,187,151**	**—302,619**	**20,331,551**	**20,151,247**	**19,874,513**	**—276,734**	**3,628,653**	**3,724,013**	**3,690,284**	**—33,729**	**595,528**	**614,510**	**622,354**	**+7,844**
NEW ENGLAND	**2,234,947**	**2,212,630**	**2,197,930**	**—14,700**	**1,858,598**	**1,857,706**	**1,847,678**	**—10,028**	**339,222**	**312,044**	**306,260**	**—5,784**	**37,127**	**42,880**	**43,992**	**+1,112**
Maine	199,536	190,603	199,110	+8,507	152,946	153,782	161,244	+7,462	40,124	31,140	32,065	+925	6,466	5,681	5,801	+120
New Hampshire	121,931	121,575	122,122	+547	104,272	101,744	102,050	+306	14,182	16,043	16,229	+186	3,477	3,788	3,843	+55
Vermont	79,931	79,459	80,051	+592	62,855	65,444	65,736	+292	14,353	11,448	11,703	+255	2,723	2,567	2,612	+45
Massachusetts	1,221,235	1,165,282	1,140,669	—24,613	1,035,762	976,782	958,806	—17,976	170,171	170,191	162,739	—7,452	15,302	18,309	19,124	+815
Rhode Island	189,093	190,319	190,088	—231	162,441	162,456	161,589	—867	23,182	24,493	24,988	+495	3,470	3,370	3,511	+141
Connecticut	423,221	465,392	465,890	+498	340,322	397,498	398,253	+755	77,210	58,729	58,536	—193	5,689	9,165	9,101	—64
MIDDLE ATLANTIC	**6,895,089**	**7,039,298**	**7,028,520**	**—10,778**	**5,816,143**	**5,809,414**	**5,776,438**	**—32,976**	**969,430**	**1,104,090**	**1,129,796**	**+25,706**	**109,516**	**125,794**	**122,286**	**—3,508**
New York	3,648,040	3,793,254	3,802,387	+9,133	3,099,932	3,088,550	3,064,628	—23,922	523,497	668,921	701,959	+33,038	24,611	35,783	35,800	+17
New Jersey	1,152,207	1,172,332	1,190,361	+18,029	950,150	975,787	994,994	+19,207	159,162	154,103	155,164	+1,061	42,895	42,442	40,203	—2,239
Pennsylvania	2,094,842	2,073,712	2,035,772	—37,940	1,766,061	1,745,077	1,716,816	—28,261	286,771	281,066	272,673	—8,393	42,010	47,569	46,283	—1,286
E. N. CENTRAL	**5,831,861**	**5,811,553**	**5,698,660**	**—112,893**	**4,970,999**	**4,922,710**	**4,823,429**	**—99,281**	**792,058**	**816,554**	**798,452**	**—18,102**	**68,804**	**72,289**	**76,779**	**+4,490**
Ohio	1,530,458	1,504,131	1,477,736	—26,395	1,319,348	1,294,270	1,271,308	—22,962	188,246	189,082	186,317	—2,765	22,864	20,779	20,111	—668
Indiana	691,656	696,974	679,901	—17,073	590,867	590,156	575,280	—14,876	91,683	92,188	90,948	—1,240	9,106	14,630	13,673	—957
Illinois	1,873,095	1,883,870	1,819,394	—64,476	1,589,547	1,594,607	1,534,362	—60,245	264,706	271,501	262,146	—9,355	18,842	17,762	22,886	+5,124
Michigan	1,099,311	1,085,348	1,080,199	—5,149	937,036	914,833	911,736	—3,097	158,344	166,398	164,604	—1,794	3,931	4,117	3,859	—258
Wisconsin	637,341	641,230	641,430	+200	534,201	528,844	530,743	+1,899	89,079	97,385	94,437	—2,948	14,061	15,001	16,250	+1,249
W. N. CENTRAL	**2,376,182**	**2,341,677**	**2,323,167**	**—18,510**	**1,958,726**	**1,932,525**	**1,920,645**	**—11,880**	**359,934**	**361,097**	**354,867**	**—6,230**	**57,522**	**48,055**	**47,655**	**—400**
Minnesota	480,972	463,357	459,355	—4,002	400,275	378,124	376,942	—1,182	63,284	65,637	63,013	—2,624	17,413	19,596	19,400	—196
Iowa	468,818	467,172	464,998	—2,174	382,186	398,277	395,285	—2,992	77,660	64,302	65,060	+758	8,972	4,593	4,653	+60
Missouri	667,707	665,120	659,379	—5,741	558,556	551,455	547,892	—3,563	93,917	107,147	105,000	—2,147	15,234	6,518	6,487	—31
North Dakota	67,094	68,334	68,040	—294	51,220	48,779	49,195	+416	13,469	16,844	16,312	—532	2,405	2,711	2,533	—178
South Dakota	87,803	83,839	83,356	—483	67,586	64,422	63,858	—564	17,048	15,379	15,237	—142	3,169	4,038	4,261	+223
Nebraska	247,778	245,460	241,905	—3,555	208,292	203,066	200,319	—2,747	36,115	36,191	35,424	—767	3,371	6,203	6,162	—41
Kansas	356,010	348,395	346,134	—2,261	290,611	288,402	287,154	—1,248	58,441	55,597	54,821	—776	6,958	4,396	4,159	—237
SOUTH ATLANTIC	**1,818,943**	**1,805,667**	**1,765,714**	**—39,953**	**1,492,877**	**1,491,927**	**1,456,537**	**—35,390**	**302,312**	**289,633**	**284,717**	**—4,916**	**23,754**	**24,107**	**24,460**	**+353**
Delaware	44,378	48,737	48,616	—121	35,662	40,439	40,167	—272	8,156	7,773	7,863	+90	560	525	586	+61
Maryland	447,806	325,802	322,005	—3,797	380,687	284,945	281,505	—3,440	65,138	38,939	38,673	—266	1,981	1,918	1,827	—91
Dist. of Columbia		130,707	131,475	+768		114,562	114,754	+192		15,904	16,596	+692		241	125	—116
Virginia	263,551	262,960	261,271	—1,689	222,329	218,858	215,259	—3,599	36,562	39,156	40,836	+1,680	4,660	4,946	5,176	+230
West Virginia	200,462	191,328	188,010	—3,318	151,187	155,699	152,903	—2,796	45,897	32,403	31,717	—686	3,378	3,226	3,390	+164
North Carolina	251,335	262,779	260,027	—2,752	200,149	216,979	214,886	—2,093	46,660	40,747	39,674	—1,073	4,526	5,053	5,467	+414
South Carolina	124,232	110,476	109,315	—1,161	100,097	87,074	86,111	—963	22,562	21,558	21,322	—236	1,573	1,844	1,882	+38
Georgia	242,852	220,894	214,984	—5,910	197,917	173,153	169,457	—3,696	43,710	45,996	43,850	—2,146	1,225	1,745	1,677	—68
Florida	244,327	251,984	230,011	—21,973	204,849	200,218	181,495	—18,723	33,627	47,157	44,186	—2,971	5,851	4,609	4,330	—279
E. S. CENTRAL	**845,899**	**820,187**	**790,514**	**—29,673**	**677,141**	**654,175**	**631,236**	**—22,939**	**153,677**	**153,345**	**143,526**	**—9,819**	**15,081**	**12,667**	**15,752**	**+3,085**
Kentucky	292,135	281,961	274,834	—7,127	234,702	228,318	222,692	—5,626	51,766	47,932	43,446	—4,486	5,667	5,711	8,696	+2,985
Tennessee	253,504	256,646	248,042	—8,604	202,758	206,164	199,790	—6,374	44,833	47,235	45,192	—2,043	5,913	3,247	3,060	—187
Alabama	193,443	185,308	174,755	—10,553	155,526	148,304	139,710	—8,594	36,310	35,630	33,346	—2,284	1,607	1,374	1,699	+325
Mississippi	106,817	96,272	92,883	—3,389	84,155	71,389	69,044	—2,345	20,768	22,548	21,542	—1,006	1,894	2,335	2,297	—38
W. S. CENTRAL	**1,330,057**	**1,296,342**	**1,253,198**	**—43,144**	**1,038,978**	**1,007,527**	**971,352**	**—36,175**	**234,461**	**240,956**	**230,354**	**—10,602**	**56,618**	**47,859**	**51,492**	**+3,633**
Arkansas	132,412	123,632	119,251	—4,381	95,737	92,529	89,295	—3,234	30,859	25,316	24,200	—1,116	5,816	5,787	5,756	—31
Louisiana	193,178	207,183	200,349	—6,834	156,574	169,103	162,535	—6,568	29,267	33,166	32,347	—819	7,337	4,914	5,467	+553
Oklahoma	301,995	281,952	274,821	—7,131	227,660	215,191	209,108	—6,083	53,315	48,308	47,145	—1,163	21,020	18,453	18,568	+115
Texas	702,472	683,575	658,777	—24,798	559,007	530,704	510,414	—20,290	121,020	134,166	126,662	—7,504	22,445	18,705	21,701	+2,996
MOUNTAIN	**653,496**	**633,789**	**623,601**	**—10,188**	**498,028**	**484,322**	**473,747**	**—10,575**	**96,405**	**92,017**	**91,416**	**—601**	**59,063**	**57,450**	**58,438**	**+988**
Montana	85,120	84,147	82,012	—2,135	66,844	66,410	64,254	—2,156	15,137	14,527	14,257	—270	3,139	3,210	3,501	+291
Idaho	83,016	75,713	74,236	—1,477	52,853	51,377	49,931	—1,446	14,307	11,358	11,117	—241	15,856	12,978	13,188	+210
Wyoming	36,241	33,642	32,987	—655	30,067	26,267	25,744	—523	4,827	6,059	5,975	—84	1,347	1,316	1,268	—48
Colorado	211,133	207,866	206,405	—1,461	164,834	164,225	162,503	—1,722	31,116	28,986	29,201	+215	15,183	14,655	14,701	+46
New Mexico	33,781	35,256	34,993	—263	27,055	26,773	26,492	—281	4,995	6,415	6,434	+19	1,731	2,068	2,067	—1
Arizona	73,038	71,673	68,871	—2,802	56,347	55,016	51,971	—3,045	10,344	10,098	9,855	—243	6,347	6,559	7,045	+486
Utah	111,870	107,776	105,964	—1,812	85,672	80,712	79,002	—1,710	13,172	11,439	11,371	—68	13,026	15,625	15,591	—34
Nevada	19,297	17,716	18,133	+417	14,356	13,542	13,850	+308	2,507	3,135	3,206	+71	2,434	1,039	1,077	+38
PACIFIC	**2,569,258**	**2,528,627**	**2,505,847**	**—22,780**	**2,020,061**	**1,990,941**	**1,973,451**	**—17,490**	**381,154**	**354,277**	**350,896**	**—3,381**	**168,043**	**183,409**	**181,500**	**—1,909**
Washington	454,143	425,783	420,775	—5,008	343,326	324,062	323,180	—882	60,311	61,267	56,531	—4,736	50,506	40,454	41,064	+610
Oregon	241,795	233,447	227,282	—6,165	187,564	179,082	174,074	—5,008	36,852	34,603	33,403	—1,200	17,379	19,762	19,805	+43
California	1,873,320	1,869,397	1,857,790	—11,607	1,489,171	1,487,797	1,476,197	—11,600	283,991	258,407	260,962	+2,555	100,158	123,193	120,631	—2,562

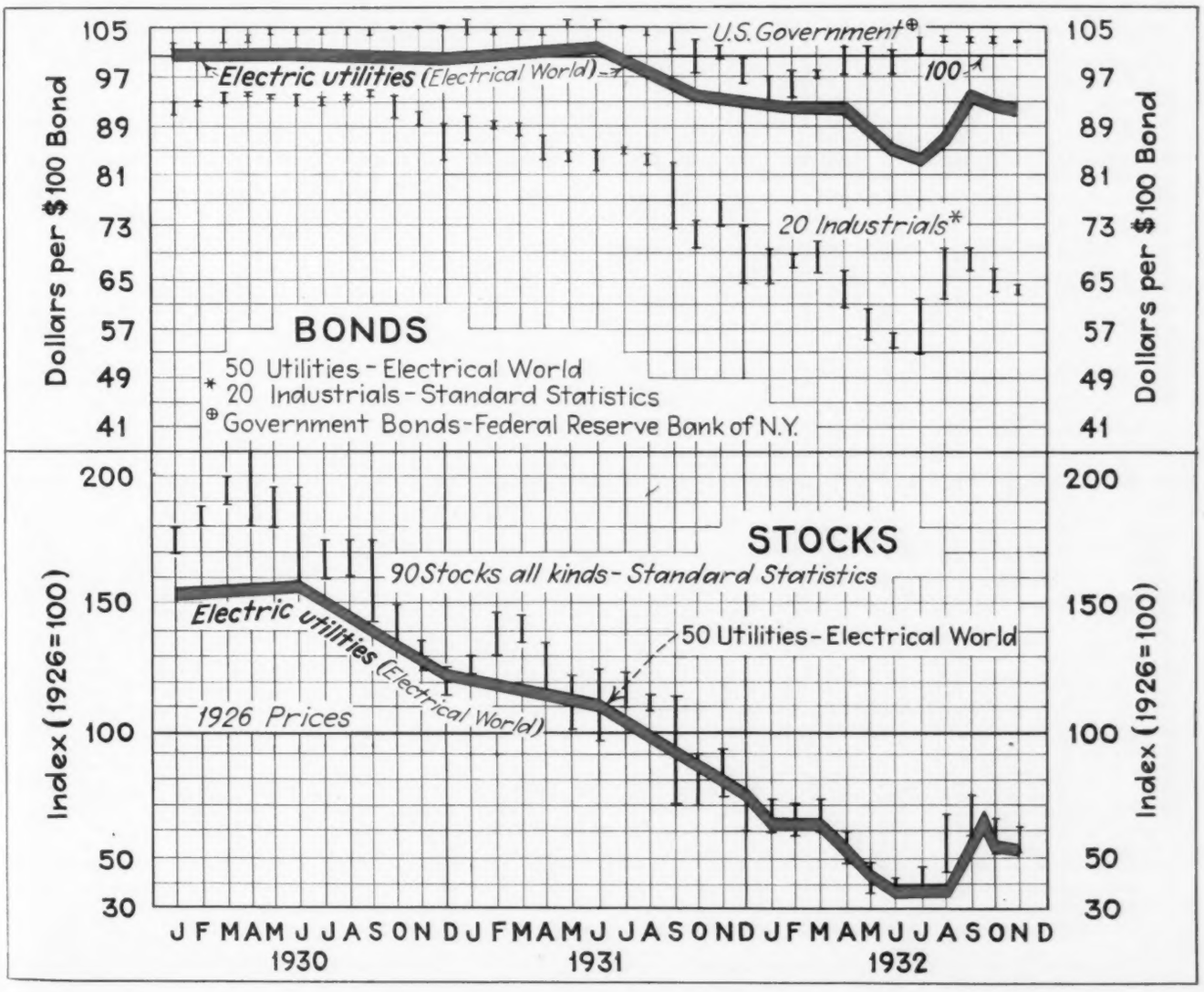
*Reclassification makes 1930 data not strictly comparable with others. See text. † For allocation of farm customers see text. ‡ As of Oct. 1.

Ewing Galloway

Stock Market Prices

CAREFULLY selected utility securities are in favor with wise investors both as regards present returns and future appreciation. Utility bonds rate next to government bonds and utility stocks have had relatively small decreases in price during the year. This is true despite the effect of the Insull and other holding company failures.

The upturn in power production should be reflected in increased earnings and better security prices, but the market level for this year will depend very largely upon the recovery of general business. Bank loans and maturities are not burdening the utilities so greatly this year and this will tend to stabilize prices.



Capacity of Generators in Public Utility Power Plants*

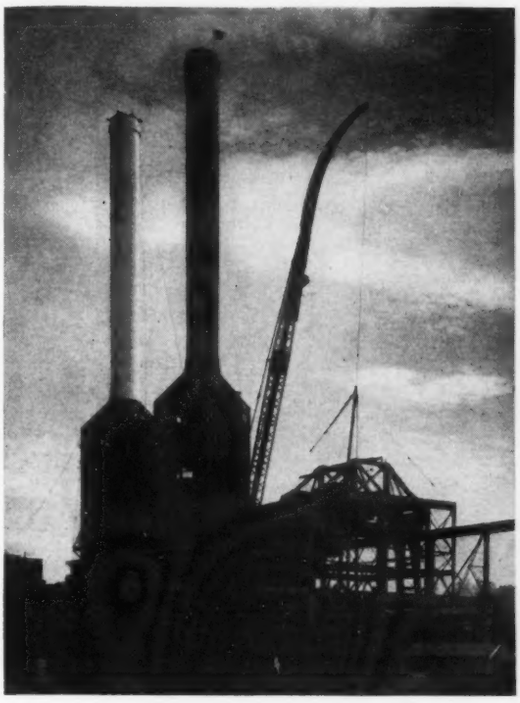
November, 1932 — By Courtesy of United States Geological Survey

Division and State	Companies†	Plants	Total Capacity, Kw.	Generator Capacity of Plants Operated By										
				One Type of Prime Mover						Combination of Two or More Types				
				Water Power		Steam Power		Internal Comb. Engines		Total		Water Power	Steam Power	Int. Comb. Engines
				No.	Kw.	No.	Kw.	No.	Kw.	No.	Kw.	Kw.	Kw.	Kw.
United States	**1,550**	**3,878**	**36,226,412**	**1,342**	**9,448,589**	**1,439**	**25,450,242**	**811**	**364,237**	**286**	**963,344**	**283,290**	**568,620**	**111,434**
New England	**144**	**332**	**2,941,062**	**214**	**788,479**	**81**	**2,015,640**	**6**	**5,476**	**31**	**131,467**	**25,533**	**103,490**	**2,444**
Maine	25	78	261,702	66	208,525	6	49,730	1	557	5	2,890	1,446	900	544
New Hampshire	15	53	285,888	38	218,313	6	41,955	1	480	8	25,140	4,150	20,050	940
Vermont	25	72	178,483	62	161,871	4	11,200	0	0	6	5,412	2,502	2,910	0
Massachusetts	53	81	1,347,834	26	120,290	44	1,151,575	3	3,214	8	72,755	14,755	57,040	960
Rhode Island	4	7	242,950	3	1,750	4	241,200	0	0	0	0	0	0	0
Connecticut	22	41	624,205	19	77,730	17	519,980	1	1,225	4	25,270	2,680	22,590	0
Middle Atlantic	**153**	**423**	**9,337,556**	**199**	**1,342,232**	**177**	**7,811,210**	**21**	**19,842**	**26**	**164,272**	**125,320**	**36,710**	**2,242**
New York	78	254	5,362,110	163	1,126,192	72	4,215,715	5	8,408	14	11,795	6,505	4,155	1,135
New Jersey	12	26	1,278,215	3	950	19	1,268,225	2	1,740	2	7,300	5,100	2,200	0
Pennsylvania	63	143	2,697,231	33	215,090	86	2,327,270	14	9,694	10	145,177	113,715	30,355	1,107
East North Central	**306**	**689**	**8,254,459**	**264**	**622,640**	**346**	**7,391,830**	**38**	**19,618**	**41**	**220,371**	**20,360**	**189,158**	**10,853**
Ohio	66	106	2,148,141	8	10,380	88	2,067,506	6	2,010	4	68,245	2,695	65,350	200
Indiana	56	107	1,054,637	18	29,770	81	1,014,600	6	3,592	2	6,675	3,200	3,260	215
Illinois	59	112	2,558,990	15	45,500	82	2,423,566	9	4,204	6	85,720	5,535	77,905	2,280
Michigan	62	180	1,630,933	114	296,237	46	1,316,860	10	3,366	10	14,470	1,910	7,285	5,275
Wisconsin	63	184	861,758	109	240,753	49	569,298	7	6,446	19	45,261	7,020	35,358	2,883
West North Central	**362**	**736**	**2,638,408**	**107**	**459,995**	**272**	**1,901,639**	**284**	**123,759**	**73**	**153,015**	**13,145**	**101,874**	**37,996**
Minnesota	60	119	579,337	39	147,490	55	412,406	12	5,491	13	13,950	3,370	3,172	7,408
Iowa	66	150	587,290	26	146,600	68	341,146	40	21,287	16	78,257	3,903	67,111	7,243
Missouri	59	107	712,654	7	149,105	47	535,942	46	22,463	7	5,144	0	1,729	3,415
North Dakota	14	34	59,344	0	0	18	54,923	15	3,871	1	550	0	250	300
South Dakota	24	55	64,884	5	4,200	13	35,118	33	11,703	4	13,863	0	9,430	4,433
Nebraska	65	141	238,748	23	6,785	38	196,128	60	19,859	20	15,976	3,905	3,563	8,508
Kansas	74	130	396,151	7	5,815	33	325,976	78	39,085	12	25,275	1,967	16,619	6,689
South Atlantic	**166**	**442**	**4,354,080**	**146**	**1,857,101**	**172**	**2,304,165**	**92**	**41,897**	**32**	**150,917**	**60,779**	**82,649**	**7,489**
Delaware	6	6	7,265	0	0	4	6,350	2	915	0	0	0	0	0
Maryland	14	26	618,477	3	252,780	13	342,640	8	2,697	2	20,360	19,200	300	860
District of Columbia	3	3	228,900	1	2,400	2	226,500	0	0	0	0	0	0	0
Virginia	26	70	462,057	31	81,384	18	294,949	12	4,173	9	81,551	14,973	65,790	788
West Virginia	17	43	564,732	6	55,920	25	504,210	9	4,210	3	392	135	62	195
North Carolina	30	85	994,060	50	641,940	23	338,315	7	4,064	5	9,741	6,291	2,000	1,450
South Carolina	17	46	685,668	22	520,780	17	141,521	3	440	4	22,927	16,200	6,397	330
Georgia	19	70	426,815	30	287,647	34	130,554	4	1,134	2	7,480	3,780	3,500	200
Florida	34	93	366,106	3	14,250	36	319,126	47	24,264	7	8,466	200	4,600	3,666
East South Central	**78**	**222**	**1,718,309**	**33**	**926,506**	**103**	**726,819**	**72**	**21,741**	**14**	**43,243**	**23,415**	**17,062**	**2,766**
Kentucky	19	50	344,797	3	104,860	35	236,792	6	1,005	6	2,140	315	975	850
Tennessee	27	65	426,178	19	186,596	29	197,332	13	3,168	4	39,082	23,100	15,390	592
Alabama	10	38	884,590	11	635,050	16	245,475	11	4,065	0	0	0	0	0
Mississippi	22	69	62,744	0	0	23	47,220	42	13,503	4	2,021	0	697	1,324
West South Central	**132**	**424**	**1,715,689**	**17**	**84,435**	**140**	**1,475,607**	**240**	**104,716**	**27**	**50,931**	**1,080**	**30,679**	**19,172**
Arkansas	18	73	159,932	5	66,855	39	81,562	25	7,911	4	3,604	0	1,294	2,310
Louisiana	26	58	265,952	0	0	12	246,565	44	17,962	2	1,425	0	712	713
Oklahoma	45	93	336,355	2	1,500	30	301,630	54	28,455	7	4,770	200	1,657	2,913
Texas	43	200	953,450	10	16,080	59	845,850	117	50,388	14	41,132	880	27,016	13,236
Mountain	**130**	**314**	**1,191,851**	**155**	**779,443**	**82**	**353,090**	**47**	**19,251**	**30**	**40,067**	**9,318**	**5,448**	**25,301**
Montana	8	30	310,331	17	299,414	7	7,863	3	1,314	3	1,740	400	375	965
Idaho	18	46	228,555	39	221,315	3	2,050	0	0	4	5,190	4,180	0	1,010
Wyoming	20	35	43,767	8	15,580	16	24,135	9	3,060	2	992	400	472	120
Colorado	29	68	228,925	22	51,242	33	170,241	8	4,998	5	2,444	1,469	100	875
New Mexico	15	27	85,528	0	0	13	77,011	9	3,841	5	4,676	988	1,662	2,026
Arizona	17	41	142,606	11	87,050	9	30,790	15	4,573	6	20,193	0	2,489	17,704
Utah	19	57	141,362	52	95,992	1	41,000	1	465	3	3,905	1,740	0	2,165
Nevada	4	10	10,777	6	8,850	0	0	2	1,000	2	927	141	350	436
Pacific	**79**	**296**	**4,074,998**	**207**	**2,587,758**	**66**	**1,470,242**	**11**	**7,937**	**12**	**9,061**	**4,340**	**1,550**	**3,171**
Washington	31	80	898,097	51	697,885	21	196,077	1	48	7	4,087	2,166	970	951
Oregon	22	68	343,269	41	174,730	17	161,890	5	1,675	5	4,974	2,174	580	2,220
California	26	148	2,833,632	115	1,715,143	28	1,112,275	5	6,214	0	0	0	0	0

*The table relates to all public utility plants of 100 kw. or larger. This is a more comprehensive classification than electric light and power; it embraces also electric railway and other plants generating energy used for public utility purposes.

The omission of the very small plants does not appreciably affect the aggregate rating or output. In 1927 there were about 1,000; the number tends to decrease. The omission correspondingly affects the number of operating companies or establishments. This approaches the number of plants, since the latter usually serve isolated villages and hamlets, and are owned singly either by local companies or by the municipalities.

†Only companies that have generating plants. Excludes those purchasing all their energy. Includes municipalities.



1,700,000 Kw. in New Stations

NORMAL additions to utility power stations on a trend basis aggregate more than 1,000,000 kw. But in 1932 about 600,000 kw. was added, and contemplated additions for 1933 and later are 385,000 kw. in steam plants and 1,350,000 in hydro plants. In 1932 additions to existing steam plants dominated and in 1933 the Hoover Dam and Diablo hydro developments are major items. The two mercury-vapor turbine installations add an interesting new development to the 1933 program.

At the present time utility generating capacity is about 25 per cent in excess of the loads, but the turning of industrial plant switches to bring back industrial loads would decrease this excess to about 10 per cent. A noticeable feature of generation is the growth of small stations. At this time many preliminary negotiations are under way for more small stations, showing the economic trend toward many stations located at loads as contrasted to very large stations with transmission lines. Remodeling of old steam stations is proving to be economical in many instances and the use of internal combustion engines is increasing.

Power Plant Capacity Added During 1932

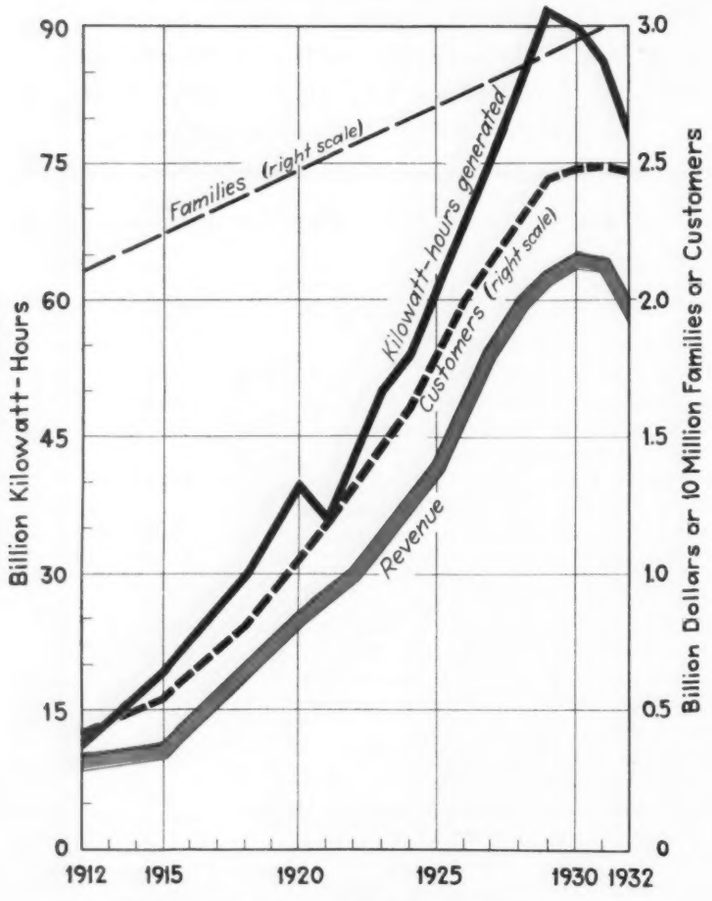
STEAM-ELECTRIC PLANTS Company, Station and Location	Added to Existing Plants, Kw.	New Plants, Kw.
Brooklyn Edison Co., Hudson Ave.	320,000	.....
Lamoka Power Corp., Keuka, N. Y.	.....	*4,550
Freeport, L. I., municipal plant	*2,000	.....
Public Service Elec. & Gas, Kearny, N. J.	75,000	.....
Public Service Elec. & Gas, Burlington, N. J.	18,000	.....
Dover, Del., municipal plant	1,250	.....
Hinsdale, Ill., municipal plant	2,000	.....
Otter Tail Power, Wahpeton, N. Dak.	7,500	.....
Brookings, S. D., municipal plant	*1,000	.....
Western Public Service, Chadron, Neb	*1,000	.....
Northwestern Public Service, North Platt, Neb.	.....	3,000
Kansas Power, Dodge City	.....	6,000
Pasadena, Calif., municipal plant	25,000	.....
HYDRO-ELECTRIC PLANTS		
Beebe Island Corp., Beebe I., near Watertown, N. Y.	.....	(*a*) 8,000
Paul Smith's Elec. Lt. & Ry., Lake Placid, N. Y.	.....	300
Safe Harbor Water Power Corp., Safe Harbor, Pa.	56,000	.....
Edison Sault Elec., Sault Ste. Marie, Mich.	(*a*) 2,000	.....
Martinsville, Va., municipal plant	1,300	.....
Central Power & Lt., Eagle Pass, Tex.	.....	7,680
Texas Hydro-Elec. Corp., TP 4, Guadalupe R.	.....	2,400
Redlands W. P. Co., Grand Junction, Colo.	.....	1,275
Calif.-Oregon Pwr. Co., Prospect No. 3	.....	7,200
U. S. Bureau of Reclam., Prosser, Yakima, Wash.	.....	3,000
So. California Edison, Borel	5,000	.....
Los Angeles, Calif., munic., San Francisquito No. 2.	.....	42,000

Hoover Dam, with 1,200,000 kw.; the St. Lawrence, with 900,000 kw.; Diablo, with 118,000 kw., and Flathead, with 112,000 kw., are very large hydro projects for 1933 business opportunities.

Power Plant Capacity Scheduled for Completion in 1933 or Later

STEAM-ELECTRIC PLANTS Company, Station and Location	Added to Existing Plants, Kw.	New Plants, Kw.
Gen'l Elec. Co. (op. by N. Y. P. & L. Co.), Schenectady	†20,000	.....
Public Service Elec. & Gas, Kearny, N. J.	†20,000	.....
Philadelphia Electric, Richmond (1934)	160,000	.....
Potomac Elec. Power, Buzzards Point	.....	35,000
Detroit Edison, Delray No. 3 (1933 or 1934)	50,000	.....
Milwaukee Elec. Ry. & Lt., Port Washington (1934)	.....	80,000
Richmond, Ind., municipal plant	15,000	.....
Colorado Springs, Colo., municipal plant	5,000	.....
HYDRO-ELECTRIC PLANTS		
Lamoka Power Corp., Keuka, N. Y. (1933 or later)	10,000	.....
Safe Harbor Water Power Corp., Safe Harbor, Pa.	56,000	.....
U. S. Gov't Lock & Dam No. 15, Mississippi R.	.....	250
Allegan, Mich., municipal plant, Kalamazoo R. (1934)	.....	2,000
Maringo R. Power, Maringo, Wis.	.....	175
Central Texas Hydro Elec., Hamilton, Tex.	20,000	.....
Rocky Mountain Power, Flathead, Mont. (1934)	.....	112,000
Sandpoint, Idaho, municipal plant, Priest R. (1934)	.....	900
U. S. Bureau of Reclam., Grand Valley, Colo.	.....	3,000
U. S. Bureau of Reclam., Hoover Dam (1937)	.....	1,200,000
Seattle, Wash., Dept. of Ltg., Diablo (1934)	.....	118,800
Puget Sound Pwr. & Lt., Rock Island, Wash.	45,000	.....
U. S. Indian Irrig. Service, Drop No. 3, Yakima R.	.....	680

*Internal-combustion engine. †Mercury-vapor turbine. (*a*) Previously reported as of 1931



Twenty years' growth of customers, usage and revenue in U. S.

Families—Customers
Kilowatt-hours—Revenue

BASIC DATA on energy, customers and revenue of light and power service are very encouraging. As compared to most industries the 1932 changes for the worse are almost negligible except as they slow up the growth of the industry for a period.

NATIONAL REVENUE in 1932 decreased about 7 per cent, energy generated about 12.5 per cent and the number of customers about 1 per cent. This remarkable record is evident in all sections of the country and indicates the stability of an industry furnishing necessary and diversified service.

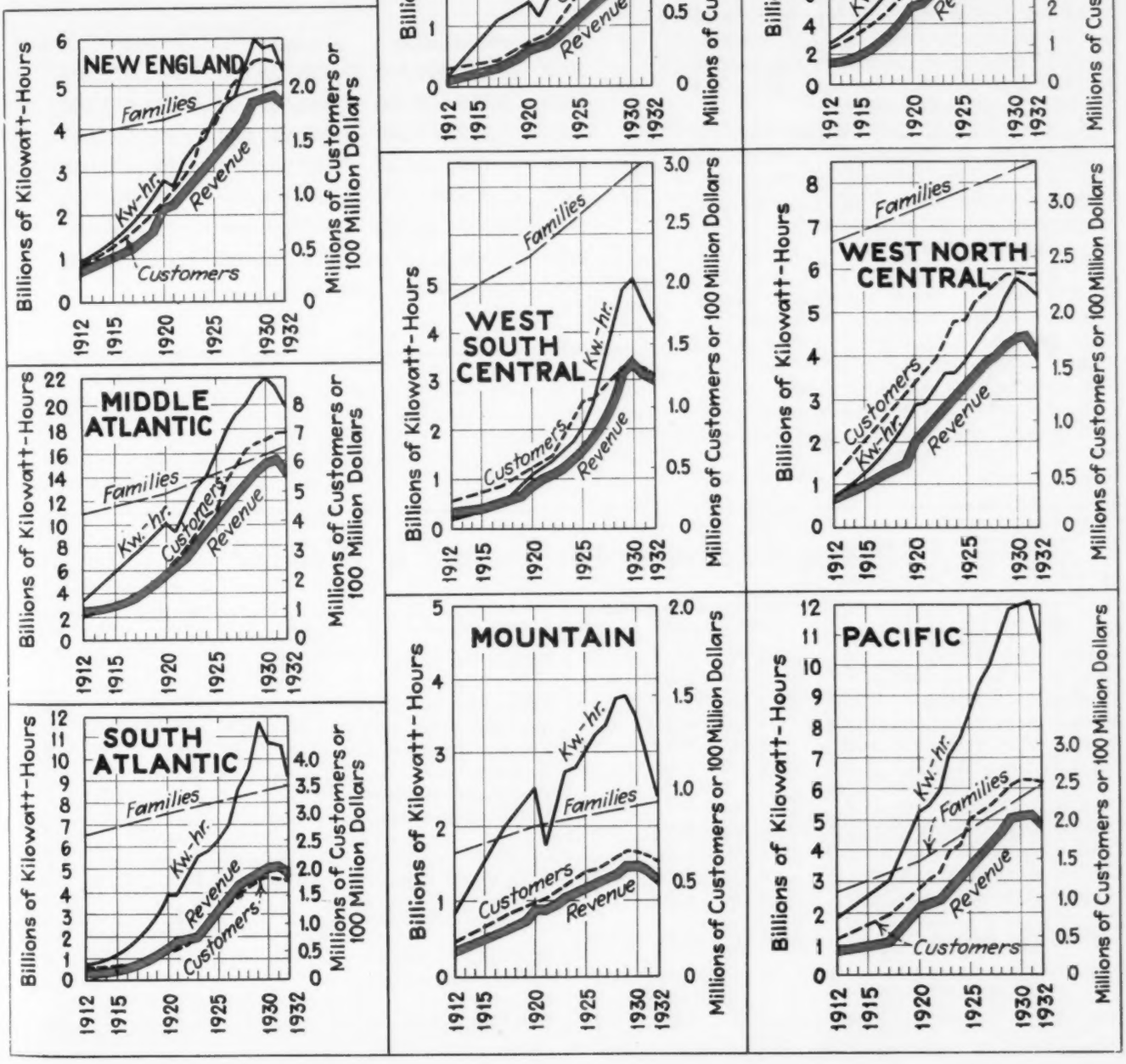
LOOKING TO THE FUTURE there is indication that an increase in the number of customers must be sought in greater saturation in some regions and more customers per family in others. No large increase can be expected unless the number of families increases. In the rural regions outlying farms and villages furnish the customer prospects but in metropolitan areas such as New England and the Middle Atlantic states the number of customers now exceed the number of families, indicating that several customers per family may be possible through multiple metering and multiple services. These data show that intensified use of present services afford the greatest business possibilities in the immediate future.

Conditions in Nine Regions

Energy generated in 1932 decreased 12.5 per cent

Revenue decreased 7 per cent

Number of customers decreased 1 per cent



Maturities and Earnings

THE light and power utilities entered 1932 with an enormous burden of maturities in the form of bank loans, debentures and bonds. The total has been estimated at about $400,000,000. This emergency was met with a minimum of failures and receiverships and despite a bad security market new financing was done to the extent of $450,000,000.

Conditions in 1933 are far more favorable. The total maturities is much less and a more favorable security market is anticipated. Bank loans especially are very low and the maturing bonds are largely those of sound operating properties. Also the stable earnings position of the industry in 1932 is of record to reassure investors as to the merits of utility securities.

An analysis of holding company financial conditions also is encouraging. Despite the fact that holding company earnings are largely contingent upon dividends from subsidiary common stocks the majority of holding companies have a splendid margin of earnings after all charges. The continued simplification of holding company structures and changes and reductions in outstanding securities dictated by experience promise to keep the holding companies in an even sounder economic condition in the future.

During 1932 utilities reduced bank loans very greatly and limited capital expenditures. This trend will continue this year, but the general financial situation is better than last year and security markets are expected to be favorable for refunding the maturing bonds.

Net Earnings Less Than 10 Per Cent of Investment

If interest, taxes, depreciation and sinking fund are included, which they are not in operating expense, the per cent of investment available to dividends and surplus would be considerably less.

Year	Investment	Earnings Gross	Earnings Net*
1922	$4,817,000,000	$1,020,439,000	$467,371,000
1927	9,500,000,000	1,802,655,000	974,487,000
1928	10,300,000,000	1,941,955,000	1,075,605,000
1929	11,100,000,000	2,105,900,000	1,171,010,000
1930	11,800,000,000	2,151,150,000	1,204,970,000
1931	12,400,000,000	2,125,110,000	1,211,200,000
1932	12,600,000,000	1,979,240,000	1,139,610,000

*Operating expenses do not include interest, taxes, depreciation or sinking fund.

Holding Companies Show Stability in Earnings*

Name of Company	Times Over-All Charges Earned 1931	1930	1929
American Electric Power	1.15	1.11	1.19
American & Foreign Power, Inc	2.15	3.07	4.39
American Gas & Electric	2.22	2.35	2.52
American Power & Light	1.56	1.69	1.77
American Water Works & Electric	1.39	1.42	1.52
Associated Gas & Electric	1.44	1.94	1.68
Cities Service Power & Light	1.36	1.55	1.52
Columbia Gas & Electric	2.98	3.95	4.64
Commonwealth & Southern	1.59	1.84	....
Consolidated Gas of New York	4.83	5.44	5.04
Continental Gas & Electric	1.66	1.70	1.77
Electric Power & Light	1.37	1.48	1.64
Federal Light & Traction	2.04	2.16	2.11
Illinois Power & Light	1.70	1.84	1.87
Midland United	1.18	1.19	1.15
National Power & Light	1.53	1.66	1.72
New England Gas & Electric Association	1.80	1.33	1.65
New England Power Association	1.61	2.03	2.21
North American	2.02	2.09	1.99
North American Edison	1.76	1.97	2.15
North American Light & Power	1.30	1.42	1.37
Philadelphia Company	2.26	2.31	2.20
Public Service Corp. of New Jersey	2.90	2.85	2.86
Standard Gas & Electric	1.36	1.48	1.33
United Light & Power	1.42	1.53	1.51
Utilities Power & Light	1.32	1.52	1.55
West Penn Electric	1.74	1.74	1.94

*Moody's Manual of Public Utilities, 1932.

Bond Maturities in 1933* Total $161,000,000

JANUARY	
City of Tacoma (Wash.) Elec. Lt. & Pwr., 5s B	$100,000
City of Tacoma (Wash.) Elec. Lt. & Pwr., 5½s A	136,000
Detroit Edison, 1st 5s	10,000,000
Dominion Gas & Elec., 6% notes	3,000,000
Edison Elec. Illum. of Boston, 5% notes	30,000,000
Flambeau Power, 1st 6s, A	12,500
Indiana Service, 6s, E	8,000
Iowa Southern Utilities, 6% notes	400,000
Northern New York Power, 1st 6s	45,000
Northern Ohio Trac. & Light, 1st cons. 5s	995,000
Northern Ohio Trac. & Light, 1st cons. 4s	2,218,000
Portland General Elec., 4% notes	7,500,000
January total	**$54,414,500**
FEBRUARY	
Central Gas & Elec., 5½% notes	$10,000,000
Elho Lamoille Power, 1st 7s	5,000
Fontana Power, 1st 6s	10,000
National Gas & Elec., 6% conv. notes	1,440,000
New England Power Association, 5½% notes	360,000
Pittsfield Electric, 1st 6s	625,000
Topeka Railway & Light, 1st ref. 5s	746,300
Western Power, Light & Tel., 6% notes	2,999,000
Wisconsin Ry., Lt. & Pwr., 1st ref. 5s	2,445,000
February total	**$18,630,300**
MARCH	
California Gas & Elec., gen. coll. 5s	$2,203,000
Central States Edison 6% notes	27,000
Central States Edison 6% sec. notes	250,000
Gary Heat, Light & Water, 1st 5s	125,000
March total	**$2,605,000**
APRIL	
Buckeye Light & Power, 6% conv. notes	$325,000
Chasm Power, 1st 5s	2,000
Little Rock Railway & Electric, 1st 5s	982,000
North American Light & Power, 5% notes	2,000,000
Otter Tail Power, gen. ref. (now 1st) 4½s F	300,000
Springfield Light, Heat & Power, gen. ref. 5s	1,307,000
April total	**$4,916,000**
MAY	
Arizona Power, 1st 6s	$386,500
City of Tacoma (Wash.) Elec. Lt. & Power, 4½s C	13,000
Columbus Electric & Power, 4½% notes	2,500,000
Edison Electric Illuminating of Boston, 4½% notes	10,000,000
Great Lakes Power, 1st 6s	120,000
Middle Wisconsin Power, 1st mtge., A	22,000
Union Electric Light & Power, ref. ext. 5s	11,026,000
May total	**$24,067,500**
JUNE	
Catawba Power, 1st 6s	$122,500
Illinois Power, 1st 5s, A	3,384,000
Iowa Southern Utilities, 6% notes	50,000
Middle West Utilities, 5% conv. notes	10,000,000
Northeastern Utility Associates, 6% coll. notes	300,000
Puget Sound Power, 1st 5s	1,957,000
Staten Island Edison, ref. imp. 6s	7,424,000
Tampa Electric, 1st 5s	593,000
Wisconsin Public Service, 6% notes	2,500,000
Wisconsin Valley Electric, 6% notes	4,000,000
June total	**$30,330,500**
JULY	
City of Tacoma (Wash.) Electric Lt. & Pwr. 5½s A	$139,000
City of Tacoma (Wash.) Electric Lt. & Pwr. 5s B.	102,000
Eastern Massachusetts Electric 1st 6s, A	135,000
Eastern Massachusetts Electric 1st 6s, B	75,000
Eastern Massachusetts Electric 1st 6s, C	90,000
Indiana Service, eq. 6s, E	8,000
Inter-Mountain Water & Power, 1st 7s	69,000
Janesville Electric, 1st ref. (now 1st), 5s	10,000
Michoacan Power, 1st 6s	100,000
New London Gas & Electric, 1st cons. ref. 5s	373,500
United Gas & Electric, 1st 5s	35,000
July total	**$1,136,500**
AUGUST	
General Gas & Electric, 5% notes	$1,573,000
Montana Power Transmission, 1st 5s	3,076,000
Roosevelt Water, Power & Light, 1st 6s	3,000
August total	**$4,652,000**
SEPTEMBER	
Redlands Water & Power, 1st 5½s	$2,000
September total	**$2,000**
OCTOBER	
Burlington Railway & Light, 1st 8s (formerly 5s)	$1,399,000
Emmetsburg (Ga.) Municipal Electric Lt. & Pwr., 6s	10,000
Granville (N. Y.) Electric & Gas, cons. 5s	26,500
Iowa Southern Utilities, 1st 6s and 8s	1,528,500
Mid-Cities Utilities, 5½% notes	50,000
Salt River Valley Water Users' Association (Stewart Mt. Pr. Pro.) 5½s	54,000
San Gorgiona Power, 1st 7s	9,000
United Public Service, deb. 6½s	3,585,300
October total	**$6,662,300**
NOVEMBER	
Arkansas Pass-Rockfort Lt., Ice & Pwr. 1st 6s	$15,000
City of Tacoma (Wash.) El. Lt. & Pr., 4½s C	13,000
East Coast Utilities conv. deb., 6s, A	996,000
Pittsford Power, 1st 5s	168,700
San Francisco Gas & Electric, gen. 4½s	5,018,000
November total	**$6,210,700**
DECEMBER	
Arizona Edison, 6½% notes	$1,349,000
Central West Public Service, 1st coll. 5s, C	2,800,000
General Public Utilities, 6% sec. notes	3,533,000
Iowa Southern Utilities, 6% notes	50,000
Texas Power, 7% notes	60,000
December total	**$7,792,000**

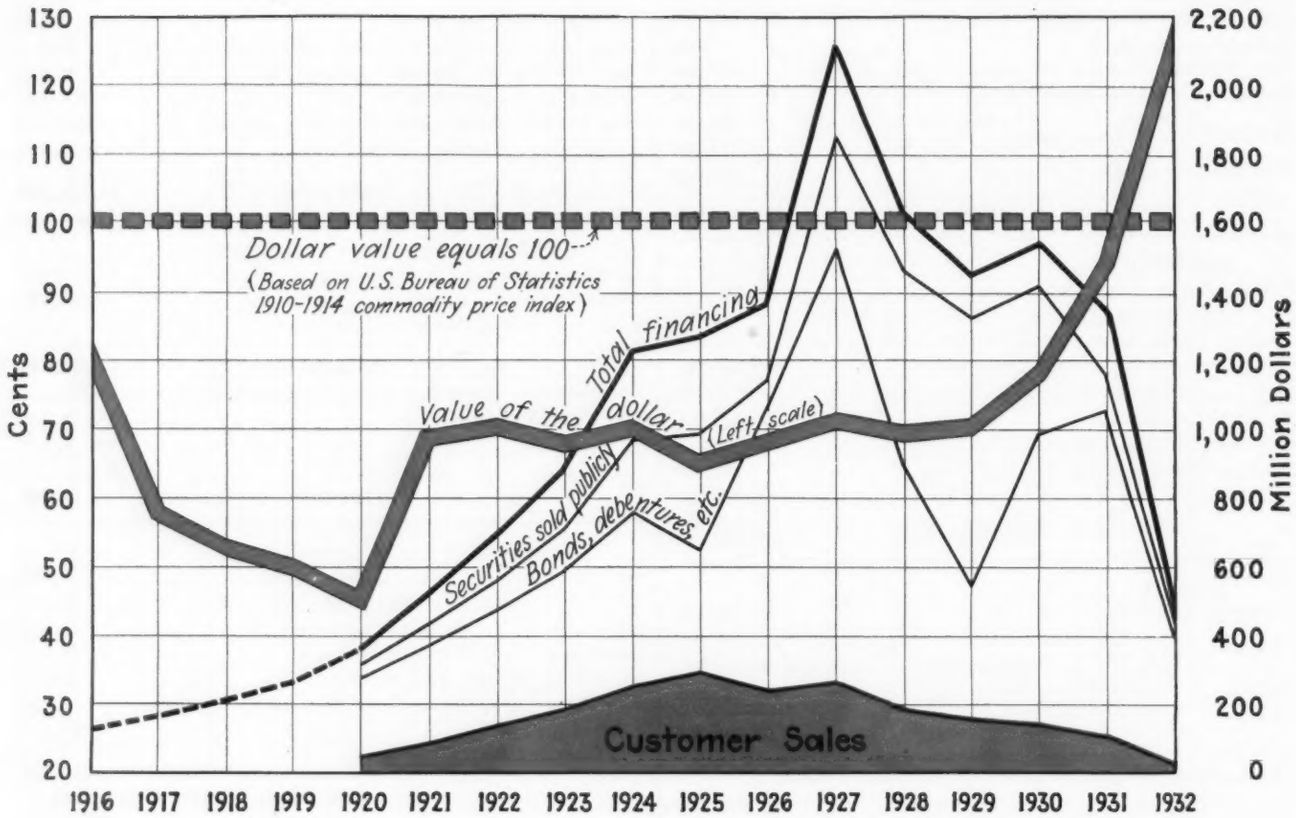
Grand Total Bond Maturities

1933 . . . . . $161,419,300

1932 164,945,560

*Moodys' Manual of Public Utilities, 1932

Financing Totals $465,920,000



FINANCING by light and power companies in 1932 totaled $465,920,608 and of this sum mortgage bonds accounted for $291,503,800. Only one issue of debentures was recorded and two note issues. No public issues of stock were made and there was a great drop in rights and customer sales.

Mortgage bonds were sold to yield as low as 4.95 per cent and as high as 8.25 per cent, with an average of about 5.6 per cent. The average yield for bonds issued in 1931 was 4.6 per cent, showing the changed conditions for financing. Security markets were not receptive to major financing in 1932 and the record of the utilities is very creditable when compared to that of other industries. The reluctance of investors to buy securities was evident in all industries and even in customer sales, although in general utilities minimized customer security sales as a policy.

Stock sales in 1928, 1929 and 1930 enabled the utilities to balance their capital structures splendidly, so that the preference of investors for bonds in the present market does not distort the proportions in present structures. Refunding also was practiced in the period of favorable markets, therefore maturities in this market are at a minimum.

Capital expenditures for property improvements last year and this year are at a minimum because of the low volume of general business, so that a great amount of new capital is not required at the present time, when securities must be sold at a relatively high yield.

A serious financial problem confronting the utilities deals with the fluctuation of dollar values and the prin-

Ten-Year Financing Over $14,000,000,000

	Public Sales	Customer Sales	Total Sales
1920	$326,374,000	$43,000,000	$369,374,000
1921	458,917,000	80,000,000	538,917,000
1922	589,961,000	130,000,000	719,961,000
1923	747,722,000	175,000,000	922,722,000
1924	982,421,000	254,000,000	1,236,421,000
1925	982,223,000	297,561,000	1,279,784,000
1926	1,150,965,000	236,557,100	1,387,522,100
1927	1,888,909,000*	263,527,000	2,152,436,000
1928	1,471,497,000*	181,682,041	1,653,179,000
1929	1,328,708,000*	153,436,000	1,482,144,000
1930	1,452,853,000*	139,132,000†	1,591,985,000
1931	1,341,742,000*	150,000,000†	1,491,742,000
1932	447,920,608*	18,000,000†	465,920,608

* Including rights. † Approximately.

ciple of refunding. Undoubtedly readjustments of outstanding securities and of book values for property will be had better to conform to present market prices and the changed value of the dollar. Securities in general have already declined more than enough to compensate for the changed values and a rearrangement of surplus and book values can be made to adjust the present balance sheet to present values.

Utility commissions and some large investors urge that larger depreciation and reserve funds be set aside by utilities, and some go so far as to advocate capital write-off as contrasted with capital refunding. This may or may not be advisable or necessary, but if this is done it will mean increased rates for service. Adequate reserve funds contribute to the stability of any business, but there is no measure at present for determining what is an adequate reserve except good business judgment for each property. Capital write-off as compared to capital refunding financial policies introduce many debatable aspects, both in the public interest and in the interest of the utilities. It is true that industrials write off investments rapidly, but a regulated utility is an entirely different kind of business and it is very doubtful that rates for service should reflect the extra charges introduced by a rapid write-off of investment.

The major incentive for readjusting capitalization and book values at present is to meet competition from new installations of private industrial and municipal plants. These installations can be made at present values and with improved technical equipment and afford serious competition in many instances. This competition is being met by utilities putting in the new investment themselves and by readjusting values of their past installations. While not serious in magnitude at present, good business judgment is being applied to meet this competition on an improved basis.

Financing during 1933 is expected to be largely refunding operations for maturing bonds. The magnitude is expected to be about $250,000,000, unless a decided upturn in business or security market conditions occurs.

Mortgage Bonds Constitute 62% of 1932 Financing

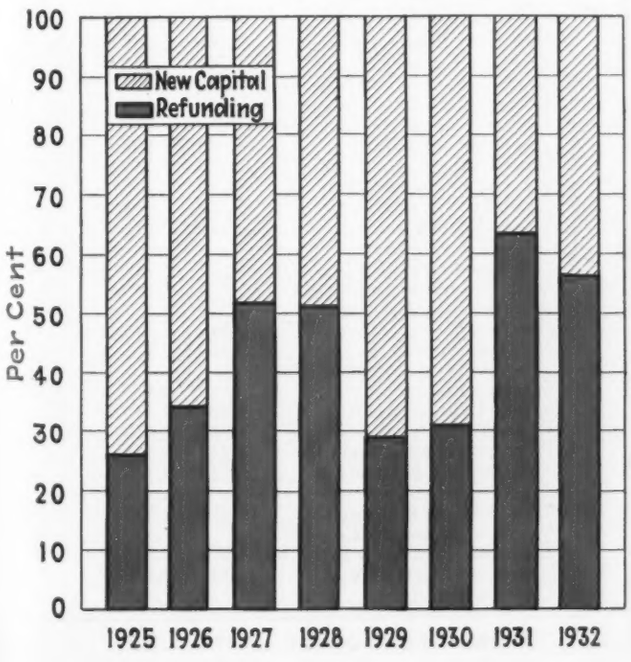
	Amount of Issue	
Mortgage Bonds (average yield 5.64%)		
6 issues yielding from 4.95 to 5.06%	$38,450,000	
6 issues yielding from 5.21 to 5.30%	99,449,000	
6 issues yielding from 5.35 to 5.50%	52,728,000	
4 issues yielding from 5.55 to 5.79%	7,830,800	
4 issues yielding from 6.00 to 6.23%	28,500,000	
5 issues yielding from 6.30 to 6.99%	36,000,000	
5 issues yielding from 7.00 to 7.25%	17,800,000	
4 issues yielding from 7.50 to 8.25%	10,746,000	
40 issues		$291,503,800
Notes (average yield 5.37 per cent)		
4 issues yielding from 4.75 to 5.44%	57,500,000	
4 issues yielding from 5.50 to 7.05%	21,500,000	
8 issues		79,000,000
Debentures		
1 issue yielding 5.44%		30,000,000
Rights		47,416,808
Total public sales		447,920,608
Estimated local sales to customers		18,000,000
All financing		465,920,608

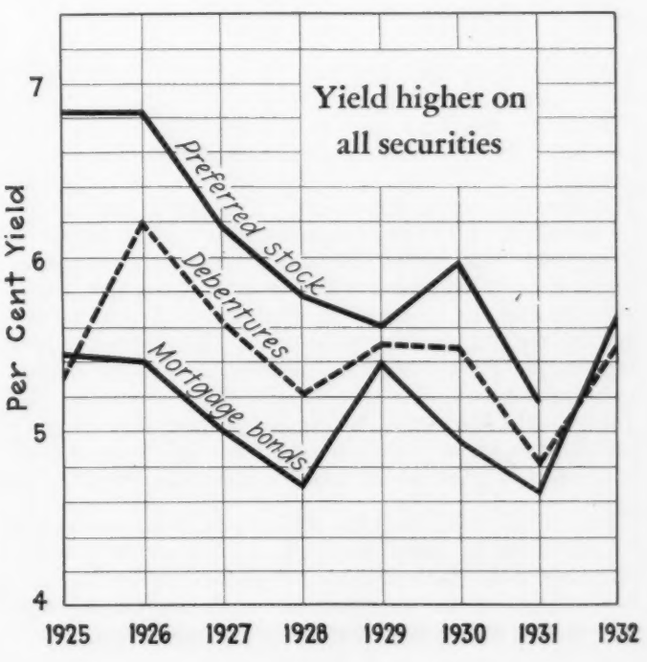
Mortgage bonds lead 1932 financing

Average yield increases to 5.6 per cent

Maturities in 1933 aggregate $160,000,000

Readjustment of capitalization and book values occurring





Unit Operating and Fin

UNIT VALUES for financial and general economic performance of electric utilities have to be founded on a considerable degree of discretion in the selection of the sample data in order to avoid inclusion of differentiating and disturbing factors which would vitiate any significance whatever to the result. Having these factors in mind a selection of the financial reports in Moody's 1932 Manual of Investments, Public Utility Securities, of 56 electric utilities was made. The data is principally for the year 1931.

THAT THE DATA are representative can be sensed from the fact that the companies included have a total installed capacity of 13,703,000 kilowatts and an annual output of 37 billion kilowatt-hours. From their 8,650,000 customers a total revenue of $715,746,000 was derived, of which $378,819,000 was devoted to operating expense, maintenance and taxes. These companies carry their plants on their books at $4,323,000,000, against which there is a funded debt of slightly less than one and three-fourths billion dollars. Stocks, at book values, represent $2,100,000,000. These samples therefore comprise more than one-third of the industry's revenue and over half the output in kilowatt-hours.

AS A GROUP the companies with far-flung systems show over twice the consumption per customer that the metropolitan companies attain and there is also a larger system capacity per customer. Both trends can be in part attributed to the heavy consumption in mining, chemical, cement and similar industries served principally by the transmission-type companies. Even eliminating Duke Power Company, exclusively a wholesaling company, the average for this group is 5,960 kilowatt-hours per customer. Eliminating this company also reduces the installed capacity per customer to 1.78 kilowatts for this group. On gross revenue per kilowatt and per kilowatt-hour the metropolitan companies show the higher values with similar factors accounting in part for the difference. Adjustment of the annual revenue per customer as before for the transmission group lowers this figure to $93, still considerably higher than for metropolitan companies because of the greater unit consumption offsetting the lower average rate resulting from heavy industrial sales.

OPERATING EXPENSES AND TAXES are higher in the cities,—per kilowatt-hour and per dollar of gross. City wages are higher and few of the city systems have the benefit of the lower annual expenditure items associated with operation of hydro plants which many of the transmission systems have. Conversely the burden of investment and funded indebtedness on each kilowatt-hour sold runs higher for the transmission companies because of those hydro plants and the extensive transmission systems required to reach the load centers and scatter the output over wide areas. Plant book values per customer are more than twice as high as for metropolitan systems. For the transmission companies the funded debt amounts to half the total book value of plant and is three times as high per customer and twice as high per dollar of gross as for metropolitan companies.

THE COMPANIES ARE ARRANGED in each group in the order of gross earnings, the largest at the top. A glance down each column will show little justification for attempting to reconcile the variations of the unit values with the sizes of the respective operations.

	Kilowatt-Hours per Customer	Kilowatt-Hours per Kilowatt	Kilowatts per Customer
Average for Group	**6,600**	**3,180**	**2.07**
1. Southern California Edison Co.	3,520	3,190	1.10
2. Duke Power Co.	*	2,260	*
3. West Penn Power Co.	7,970	3,570	2.22
4. Appalachian Elec. Power Co.	10,150	3,420	2.96
5. Ohio Power Co.	7,600	3,780	2.00
6. Alabama Power Co.	16,700	3,150	5.28
7. Oklahoma Gas & Electric Co.	3,740	2,600	1.43
8. Utah Power & Light Co.	6,830	2,840	2.41
9. Texas Power & Light Co.	4,160	4,440	0.94
10. Carolina Power & Light Co.	11,000	3,540	3.14
11. Ohio Public Service Co.	5,100	3,110	1.64
12. Public Service Co. of Oklahoma	3,420	2,660	1.24
13. Montana Power Co.	14,550	3,180	4.57
14. Texas Electric Service Co.	7,100	5,100	1.39
15. Indiana & Michigan Elec. Co.	7,980	4,650	1.88
16. Minnesota Power & Light Co.	8,960	3,130	2.87
17. Kansas Gas & Electric Co.	4,170	3,690	1.16
18. Potomac Edison Co.	4,255	2,790	1.52
19. Pacific Power & Light Co.	4,600	6,820	0.67
20. Idaho Power Co.	11,350	6,300	1.80
21. United Electric Light Co.	2,300	1,930	1.20
22. Indiana General Service Co.	4,180	3,620	1.15
23. United Power & Light Co.	3,390	3,240	1.05
24. Florida Power Corp.	4,000	1,885	2.11
25. Empire District Electric Co.	5,470	1,617	3.38
26. Bangor Hydroelectric Co.	2,895	2,750	1.05
27. Southern Colorado Power Co.	2,640	2,605	1.01
28. Michigan Public Service Co.	1,585	2,325	0.68
29. Tennessee Eastern Electric Co.	3,070	1,093	2.81
30. East Oregon Light & Power Co.	1,730	3,820	0.46
31. Central Kansas Power Co.	2,110	2,065	1.02
Average for Group	**3,210**	**2,370**	**1.35**
1. Commonwealth Edison Co.	4,375	3,030	1.44
2. New York Edison Co.	2,460	1,735	1.42
3. Brooklyn Edison Co.	1,323	1,145	1.15
4. Union Elec. Lt. & Pwr. Co. (Mo.)	5,870	2,770	2.28
5. Edison El. Ill. Co. of Boston	2,485	2,795	0.89
6. Duquesne Light Co.	4,520	3,080	1.43
7. United Elec. L. & P. Co. (N. Y.)	2,710	2,510	1.08
8. Cleveland Electric Illum. Co.	4,340	2,750	1.57
9. Potomac Electric Power Co.	3,465	2,495	1.39
10. Toledo Edison Co.	4,075	2,310	1.76
11. Indianapolis Power & Light Co.	3,110	3,410	0.91
12. Houston Lighting & Power Co.	5,420	2,990	1.81
13. Atlantic City Electric Co.	2,520	1,730	1.46
14. Hartford Electric Light Co.	2,510	2,390	1.05
15. Nebraska Power Co.	5,400	3,520	1.47
16. Scranton Electric Co.	3,440	2,170	1.61
17. Seattle Dept. of Lighting.	3,670	2,140	1.71
18. Dallas Power & Light Co.	3,260	2,670	1.22
19. Worcester Electric Light Co.	2,230	1,810	1.23
20. Northwestern Electric Co.	7,320	5,510	1.32
21. Salem Electric Lighting Co.	10,400	4,580	2.28
22. Erie County Electric Co.	....	....	1.64
23. Greenfield Elec. Lt. & Pwr. Co.	1,915	5,100	0.38
24. Gloucester Electric Co.	820	2,330	0.35
25. Concord Electric Co.	1,330	3,620	0.37
Average for both groups	**4,190**	**2,710**	**1.59**

Financial Ratios for Utilities Vary Widely

Transmission Systems

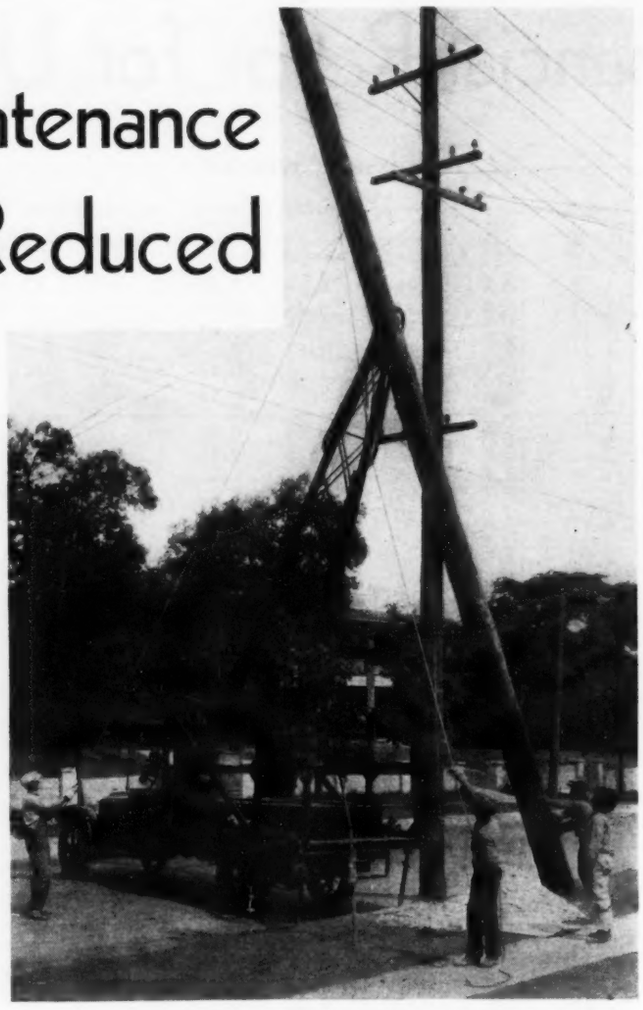
Gross Revenue per			Oper. Exp. & Taxes per		Plant Book Value per			Funded Debt per					Stock to Total Capital, Per Cent
Kilowatt (Dollars)	Kw.-Hr. (Cents)	Dollar Bk. Value (Cents)	Customer (Dollars)	Kw.-Hr. (Cents)	Dollar Gross (Dollars)	Kilowatt (Dollars)	Kw.-Hr. (Cents)	Customer (Dollars)	Kilowatt (Dollars)	Kw.-Hr. (Cents)	Customer (Dollars)	Dollar Bk. Value (Dollars)	Dollar Gross (Dollars)	
48	**1.53**	**12.7**	**101**	**0.74**	**0.48**	**383**	**12.0**	**795**	**174**	**5.48**	**362**	**0.45**	**3.57**	**51.6**
42	1.33	11.8	47	0.45	0.34	358	11.2	394	134	4.20	148	0.37	3.16	60.9
33	1.47	13.7	*	1.01	0.69	239	10.6	*	82	3.62	*	0.34	2.46	61.3
55	1.54	19.1	123	0.67	0.44	288	8.1	643	131	3.68	293	0.46	2.38	53.8
51	1.50	10.3	151	0.70	0.46	497	14.5	1,470	220	6.42	650	0.43	4.30	51.2
47	1.25	18.5	95	0.59	0.47	256	6.7	515	162	4.28	326	0.63	3.42	20.0
33	1.01	9.8	169	0.44	0.44	327	10.4	1,730	175	5.53	923	0.53	5.45	46.0
63	2.42	15.8	91	1.20	0.49	400	15.3	537	221	8.53	319	0.55	3.51	46.5
45	1.58	10.9	108	0.87	0.55	409	14.4	986	178	6.28	430	0.44	3.97	56.8
99	2.24	12.4	93	1.09	0.49	800	17.9	748	453	10.20	424	0.57	4.56	42.5
48	1.34	9.9	149	0.68	0.50	477	13.4	1,500	223	6.30	703	0.47	4.71	48.7
73	2.33	19.3	119	1.14	0.49	375	12.1	624	219	7.05	361	0.59	3.03	41.1
111	4.17	15.5	138	2.30	0.55	717	27.0	892	352	13.22	438	0.49	3.17	51.0
30	0.93	6.8	135	0.38	0.40	400	12.6	1,825	148	4.65	675	0.37	4.98	60.2
81	1.59	11.1	112	0.72	0.47	730	13.6	1,015	330	6.17	458	0.45	4.07	52.0
62	1.46	16.5	116	0.70	0.48	375	8.8	707	208	4.90	392	0.55	3.36	38.8
49	1.55	8.1	139	0.58	0.37	602	19.2	1,730	286	9.15	820	0.48	5.89	49.5
181	2.24	18.3	94	1.14	0.51	442	12.3	514	271	7.55	315	0.61	3.37	42.8
74	2.62	19.0	110	1.51	0.58	387	13.9	590	239	8.56	365	0.62	3.26	37.3
135	1.97	13.5	91	1.04	0.53	995	14.5	670	607	8.93	409	0.61	4.52	40.5
59	0.96	12.0	109	0.47	0.49	508	8.1	915	182	2.88	327	0.36	2.99	62.5
61	3.18	25.3	73	2.32	0.73	242	12.5	289	0	0	0	0	0	100.0
80	2.21	24.3	92	1.41	0.64	327	9.1	379	116	3.22	134	0.35	1.45	59.3
82	2.51	14.9	85	1.21	0.48	548	16.9	572	266	8.19	278	0.49	3.26	45.7
46	2.43	10.2	97	1.25	0.51	450	23.8	950	190	10.15	403	0.42	4.15	56.8
32	1.89	9.7	106	0.99	0.53	315	19.5	1,065	150	9.35	510	0.48	4.96	39.1
72	2.65	13.3	76	1.15	0.44	546	19.9	575	190	6.93	200	0.35	2.62	63.0
84	3.23	12.5	85	1.68	0.52	672	25.7	680	276	10.55	279	0.41	3.27	57.6
97	4.17	12.3	66	2.43	0.58	780	33.6	533	366	15.73	250	0.47	3.78	29.3
32	2.90	10.3	90	1.29	0.45	311	28.4	875	126	11.58	356	0.41	3.97	46.8
134	3.51	10.9	60	1.96	0.56	1,222	32.1	555	517	13.53	235	0.42	3.87	50.0
72	3.48	23.1	74	2.42	0.70	311	15.0	318	1,320	6.40	132	0.42	1.84	52.0

Metropolitan Systems

55	2.31	20.4	74	1.29	0.56	268	11.3	364	95	4.00	128	0.35	1.73	58.2
61	2.00	26.0	87	1.29	0.65	234	7.7	336	121	3.98	174	0.52	1.99	49.9
54	3.11	23.6	77	2.06	0.66	228	13.2	325	69	3.95	97	0.30	1.27	73.1
50	4.40	22.1	58	2.43	0.55	227	19.8	261	45	3.88	51	0.20	0.88	74.7
43	1.68	14.2	98	0.74	0.44	304	11.8	693	65	2.54	149	0.21	1.51	58.0
82	2.94	18.4	73	1.67	0.57	445	16.3	398	186	6.67	166	0.42	2.27	43.3
63	2.04	16.3	90	0.84	0.41	385	12.5	555	146	4.75	210	0.38	2.33	56.1
36	1.43	22.5	39	0.78	0.54	160	6.4	172	40	1.58	43	0.25	1.10	62.0
54	1.95	20.2	85	1.00	0.51	267	9.7	421	84	3.04	132	0.31	1.53	62.2
53	2.13	21.2	74	0.95	0.45	249	10.0	346	46	1.83	64	0.18	0.86	57.6
60	2.61	15.5	106	1.35	0.52	388	16.8	682	158	6.86	278	0.41	2.63	53.2
101	2.96	14.0	92	1.59	0.54	717	21.0	655	387	11.30	354	0.54	3.84	49.0
49	1.64	18.5	89	0.75	0.46	261	8.8	478	156	5.25	284	0.57	3.21	15.4
60	3.47	19.2	87	1.51	0.44	312	18.1	466	90	13.10	131	0.29	1.50	56.0
57	2.36	27.7	59	1.34	0.57	205	8.6	215	0	0	0	0	0	100.0
69	1.98	21.4	102	0.93	0.47	324	9.2	480	204	5.79	301	0.63	2.94	39.4
52	2.45	21.0	84	1.03	0.42	249	11.6	414	152	7.12	244	0.61	2.90	37.8
33	1.54	10.3	57	0.60	0.39	320	14.9	549	209	9.78	360	0.55	6.35	0
66	2.45	19.2	80	1.12	0.46	341	12.7	416	147	5.48	179	0.43	2.24	51.5
54	2.99	32.3	66	1.88	0.40	144	8.0	178	0	0	0	0	0	100.0
69	1.25	13.3	92	0.69	0.55	520	9.4	690	137	2.48	181	0.26	1.98	67.7
70	1.53	42.7	159	0.96	0.63	164	3.6	373	0	0	0	0	0	100.0
43	3.66	27.3	70	....	0.50	157	....	258	57	....	93	0.36	1.32	64.5
199	3.90	22.8	75	2.69	0.69	870	17.1	327	0	0	0	0	0	100.0
169	7.25	34.9	59	4.89	0.67	485	20.7	170	0	0	0	0	0	100.0
187	5.17	28.6	69	3.08	0.60	656	18.1	241	0	0	0	0	0	100.0
52	**1.93**	**16.6**	**83**	**1.02**	**0.53**	**315**	**11.7**	**500**	**127**	**4.72**	**202**	**0.40**	**2.44**	**54.7**

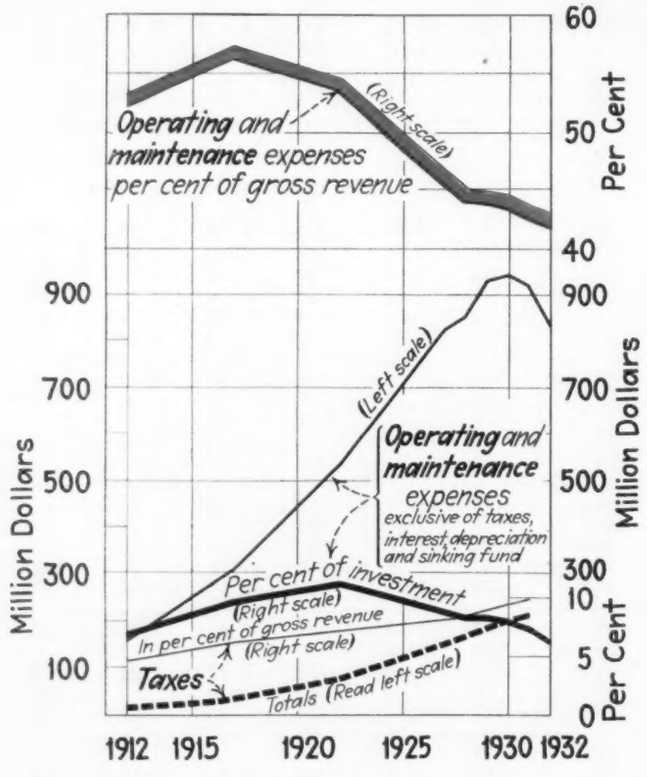
*Exclusively a wholesaling company.

Operating and Maintenance Expenses Reduced



OUT of each dollar of gross income 43 cents was spent in 1932 for operating expenses by the light and power companies. The percentage of gross revenue expended for operating expenses has decreased steadily since 1918 and extraordinary attention to these costs in 1932 brought a rapid decrease last year. The year 1930 was a peak for operating expenses in total. To these operating expenses must be added taxes, interest on funded debt, depreciation and sinking fund charges. Taxes have been mounting steadily and now exceed 10 cents of each dollar of gross revenue and amount to the staggering sum of approximately $200,000,000.

Reduction in personnel, a decrease of maintenance and construction work, a decrease in merchandising expenses, a decrease in overhead and extreme care in checking all operating costs have permitted each property to reduce operating expenses.



Operating expenses reduced to 43 per cent of gross revenue. Taxes rise to 10 per cent of gross

Taxes and reserve fund charges have been increased.

Economy should not be had at the expense of deferred maintenance.

Operating and Maintenance Expenses of Light and Power Companies

(Expressed in $1,000,000)

Including taxes, interest on funded and floating debt, depreciation and sinking fund

	United States	New England	Atlantic	North Central	South Central	Mountain Pacific
1907.....	**134.2**	12.6	49.7	39.8	9.5	22.6
1912.....	**234.6**	21.4	84.1	76.4	15.0	37.7
1917.....	**426.6**	42.0	153.4	144.6	27.6	59.0
1922.....	**859.6**	83.0	309.0	296.4	58.8	112.4
1927.....	**1,318.3**	....	.....	.....	.....	.....

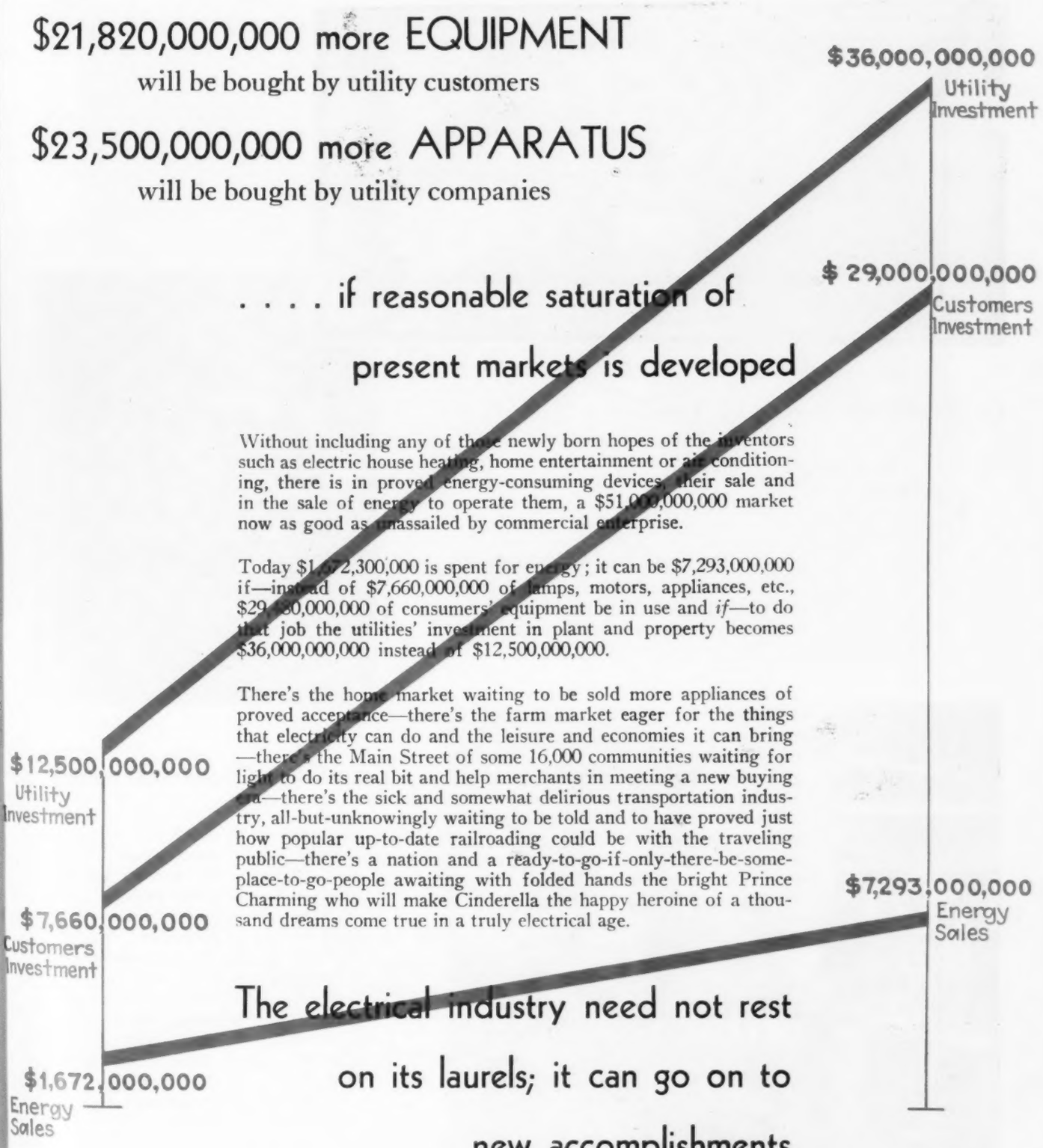
Exclusive of taxes, interest on debt, depreciation and sinking fund

1917.....	**284.8**	29.7	107.8	99.6	17.6	30.1
1922.....	**553.0**	57.7	202.7	197.0	39.1	56.5
1927.....	**828.2**	71.2	308.2	282.9	85.8	80.1
1928.....	**866.3**	75.6	327.3	280.8	91.4	91.2
1929.....	**934.9**	79.7	340.4	315.6	102.9	96.3
1930.....	**946.2**	79.6	350.4	311.8	105.4	99.0
1931.....	**913.9**	76.9	345.8	294.9	96.8	99.5
1932.....	**839.6**	70.4	323.7	267.7	87.4	90.4

$5,621,000,000 more ENERGY
will be used by utility customers

$21,820,000,000 more EQUIPMENT
will be bought by utility customers

$23,500,000,000 more APPARATUS
will be bought by utility companies



. . . . if reasonable saturation of present markets is developed

Without including any of those newly born hopes of the inventors such as electric house heating, home entertainment or air conditioning, there is in proved energy-consuming devices, their sale and in the sale of energy to operate them, a $51,000,000,000 market now as good as unassailed by commercial enterprise.

Today $1,672,300,000 is spent for energy; it can be $7,293,000,000 if—instead of $7,660,000,000 of lamps, motors, appliances, etc., $29,480,000,000 of consumers' equipment be in use and *if*—to do that job the utilities' investment in plant and property becomes $36,000,000,000 instead of $12,500,000,000.

There's the home market waiting to be sold more appliances of proved acceptance—there's the farm market eager for the things that electricity can do and the leisure and economies it can bring—there's the Main Street of some 16,000 communities waiting for light to do its real bit and help merchants in meeting a new buying era—there's the sick and somewhat delirious transportation industry, all-but-unknowingly waiting to be told and to have proved just how popular up-to-date railroading could be with the traveling public—there's a nation and a ready-to-go-if-only-there-be-some-place-to-go-people awaiting with folded hands the bright Prince Charming who will make Cinderella the happy heroine of a thousand dreams come true in a truly electrical age.

The electrical industry need not rest on its laurels; it can go on to new accomplishments

THE HOME . . . .

Of 29,000,000 homes in America . .

19,874,513 use electricity
13,000,000 have telephones
23,000,000 have passenger cars

. . . . at least 25,000,000 homes are those of families whose economic status would enable them to enjoy the "ordinary comforts of life."

Yet, of these 25,000,000 homes . .

21,501,000 have no electric refrigerator
23,904,000 have no electric range
24,700,000 have no electric water heater
17,362,000 have no clothes washer
24,273,000 have no ironing machine
24,885,000 have no dishwasher
16,753,000 have no electric toaster
22,264,000 have no waffle iron
19,105,000 have no coffee percolator
15,718,000 have no vacuum cleaner
20,650,000 have no electric clock
21,650,000 have no electric sewing machine
21,661,000 have no electric radiator
22,763,000 have no heating pad
5,227,000 have no flatiron

and at least 100,000,000 empty lighting sockets

. . . . a $21,000,000,000 Market

Eliminating farm customers, today's business and that available may be compared as resulting in this . . .

HOME MARKET

	Present Business	Available Business
Number of customers (excluding farms)	19,175,000	22,000,000
Value of appliances and wiring	$4,000,000,000	$16,000,000,000
Value of radio equipment	$1,320,000,000	$ 2,000,000,000
Consumption, kilowatt-hours	10,941,200,000	220,000,000,000
Total annual revenue for service	$661,372,500	$3,300,000,000
Annual consumption per customer, kw.-hr.	570	10,000
Annual revenue per customer	$34.50	$150

This equipment may be sold by . . .

Building the new equipment into new homes, financed as part of the original mortgage

Installation in old homes on installment purchase contracts or on a rental scheme

MAIN STREET . . . .

Stores, show windows, shops, offices, hotels, theaters, public buildings and libraries are all lighted and served today, after a fashion, but the acceptance and use of the following applications fall far short of what they should be:

LIGHTING

to draw customers to stores
to draw attention to displays
to aid in sale of specific merchandise
to advertise the merchant
to identify hotels, theaters and offices
to make more attractive hotels and theaters
to decorate interior areas
to popularize outdoor sports at night

POWER

to promote customer-comfort through air conditioning in hotels, offices, theaters, restaurants, and other places of assembly
for further introduction of labor-saving devices

ELECTRIC HEAT

for cooking in restaurants and off-season heating in other public areas and offices

Wide World

. . . . a $2,843,000,000 Market

Wide World

Store, Office, Hotel, Theater and Public Building Market

NUMBER OF CUSTOMERS . . . .

ACTUAL	AVAILABLE
3,663,946	4,230,000

EQUIPMENT AND WIRING . . . .

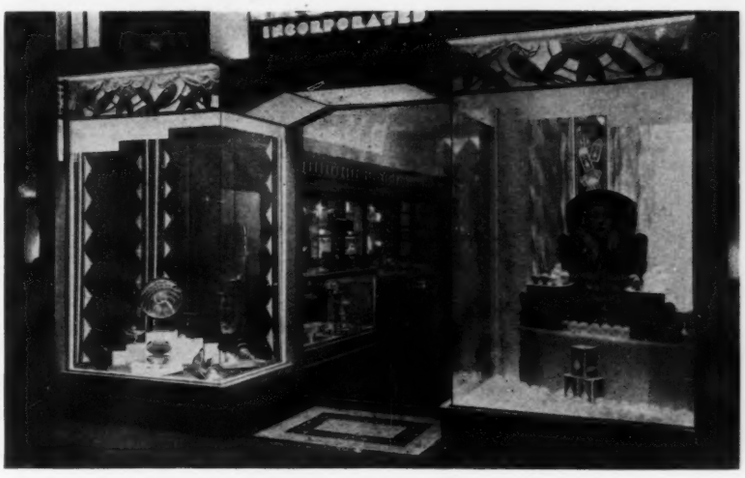
ACTUAL	AVAILABLE
$365,000,000	$1,580,000,000

CONSUMPTION (Kw.-Hr.) . . . . .

ACTUAL	AVAILABLE
7,930,000,000	32,400,000,000

ANNUAL REVENUE FOR SERVICE

ACTUAL	AVAILABLE
$456,300,000	$1,263,000,000



THE FARM—a $4,575,000,000 Market

Of the 6,288,648 farms in the United States . . . .

but 698,786 are served with central-station electricity. The farm home needs all that the urban home needs as indicated on the preceding pages and much else.

. . . . yet, the strictly rural service needs of these 698,786 farms, without allowing for additions to the number of those served, show

- 419,000 electric pumps needed
- 349,000 general-purpose motors needed
- 279,000 milking machines needed
- 342,000 dairy refrigerators needed
- 98,000 cream separators needed
- 279,000 ensilage cutters needed
- 70,000 grain grinders needed
- 70,000 incubators needed
- 105,000 poultry house lighting sets needed
- 105,000 stationary spray pumps needed
- 419,000 dairy water heaters needed

THE FARM MARKET

	Present	Available
Number of customers	698,786	3,000,000
Value of appliances and wiring	$558,030,000	$3,900,000,000
Consumption, kw.-hr.	698,786,000	45,000,000,000
Total revenue for service	$97,830,000	$675,000,000
Annual consumption per customer, kw.-hr.	1,000	15,000
Annual revenue per customer	$140	$225

I AM ELECTRICITY
THE FARMER'S HANDY ANDY

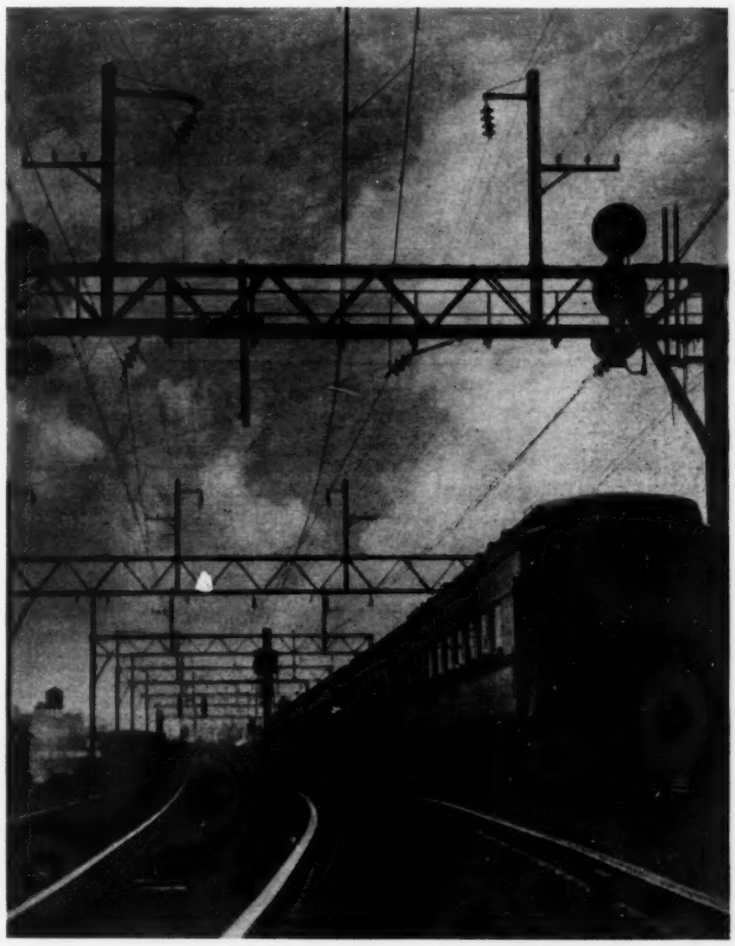
I AM ELECTRICITY
THE FARMWIFE'S HANDY ANNIE

TRANSPORTATION... an $11,530,000,000 Market

ELECTRIFICATION is introducing itself gradually upon the railroad systems of the country. The extensive use by St. Paul, Illinois Central, Pennsylvania, New York Central, New Haven, Lackawanna, Norfolk & Western and Virginian have proved its practicability and pointed to a probable trend. Railroad electrification may point the way to bring popularity once more to a transportation slow in modernizing and in meeting today's needs and fancies and now in waning favor.

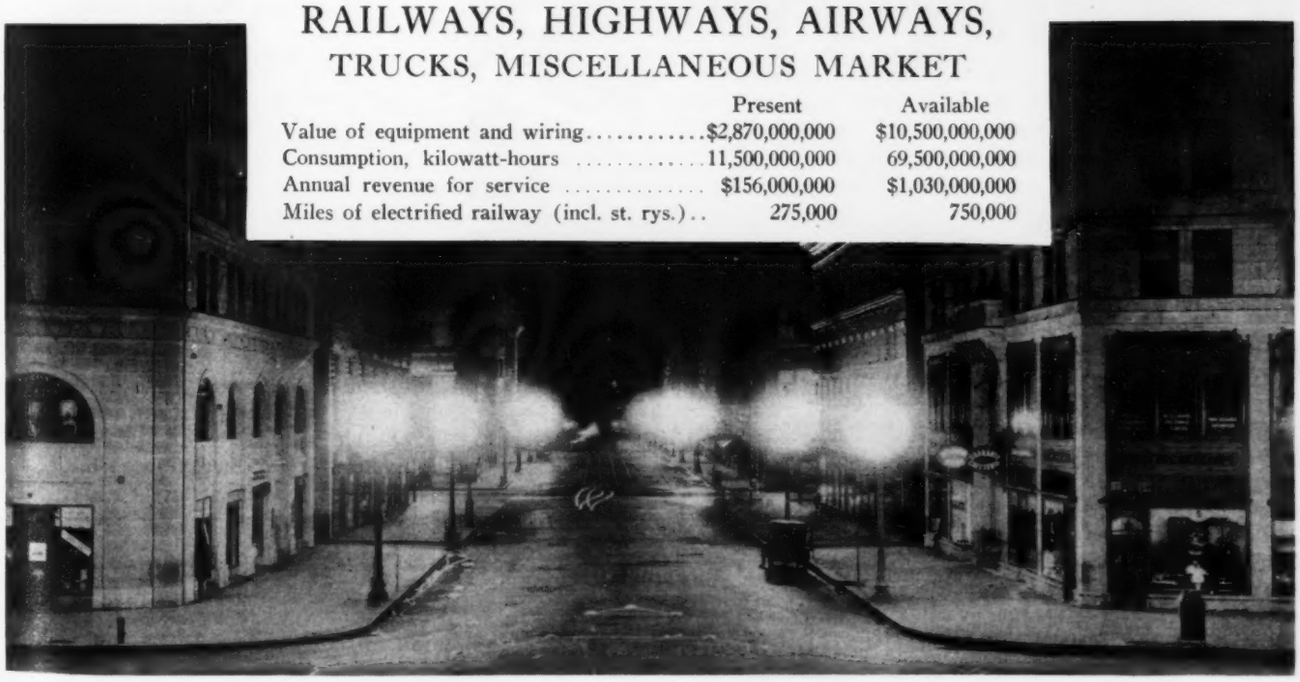
AIRWAY LIGHTING by automatically controlled, self-operating and permanent beacons has immeasurably advanced the cause of commercial air transport. The task has hardly been begun.

WILL AMERICA much longer tolerate blinding and dangerous headlighting for high-speed night traveling on the highway? Road illumination may before long be properly considered in its true relationship to the road itself—an integral part of the construction to be financed as such and no road completed until the highway is lighted effectively rather than in starred gloom.

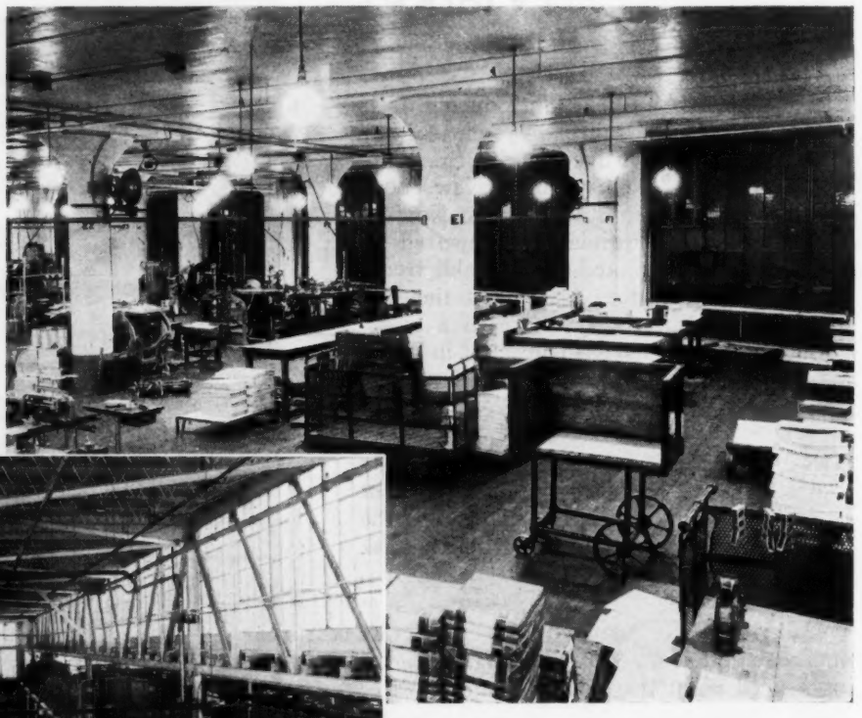


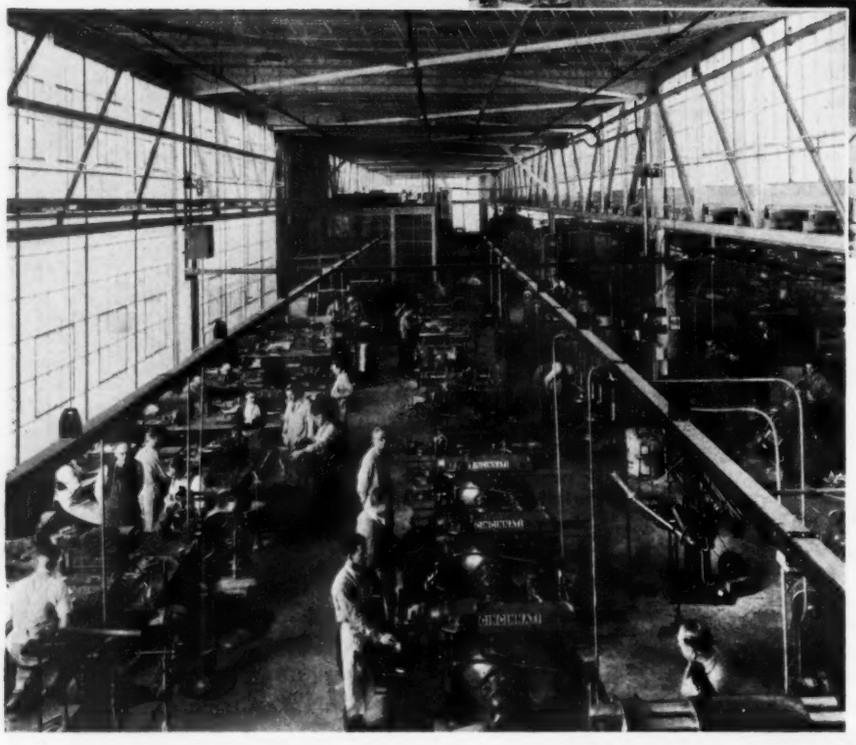
RAILWAYS, HIGHWAYS, AIRWAYS, TRUCKS, MISCELLANEOUS MARKET

	Present	Available
Value of equipment and wiring	$2,870,000,000	$10,500,000,000
Consumption, kilowatt-hours	11,500,000,000	69,500,000,000
Annual revenue for service	$156,000,000	$1,030,000,000
Miles of electrified railway (incl. st. rys.)	275,000	750,000



INDUSTRIAL PLANTS . . . .





With 35,000,000,000 hp. in 200,000 manufacturing plants American industry is about 82 per cent motorized.

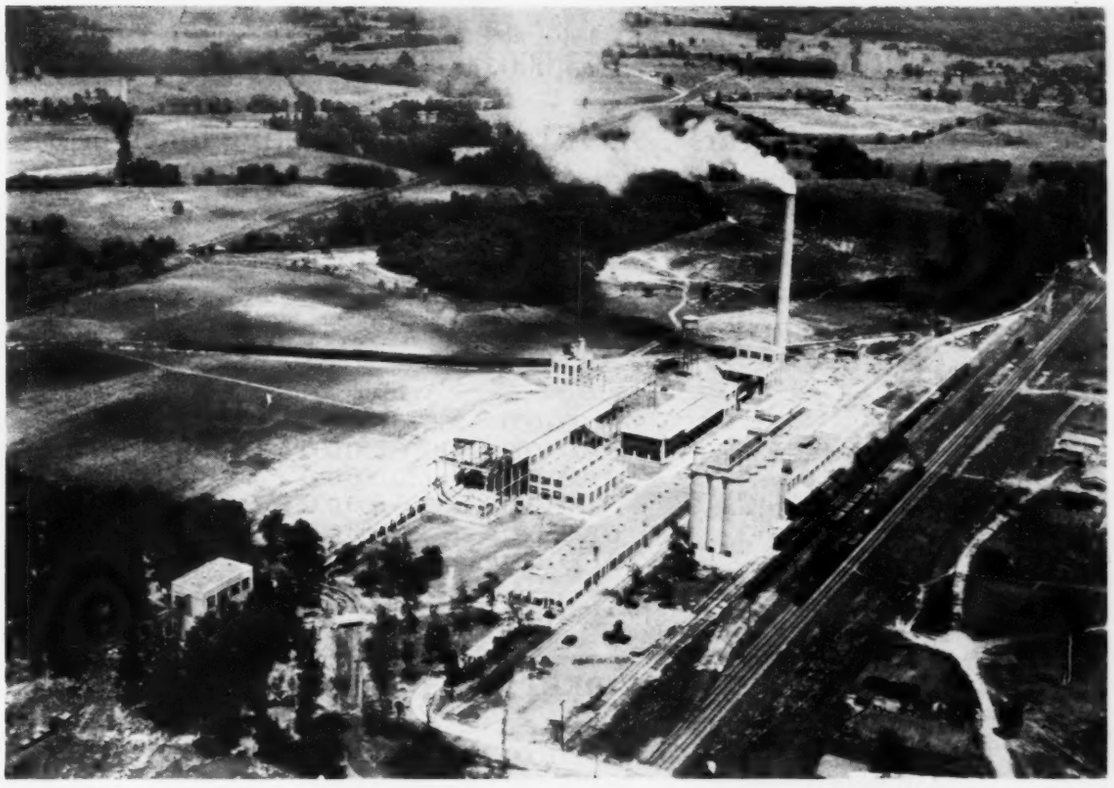
ELECTRIC HEAT with its advantages of close control, uniformity and cleanliness accounts now for but 3,500,000,000 kw.-hr. a year. Utilized to its full economic value there would be used for this purpose 63,000,000,000 kw.-hr.

AIR CONDITIONING in industrial areas holds bright promise for future progress. Comfort for the worker in hot weather has the same importance to production as comfort in cold weather. Ventilation is no less an influence on health and vigor than illumination. The social as well as the economic value of air conditioning point to its further acceptance in industry. It has amply proved its justification in the food, chemical, textile and other industries where the control of temperature and humidity has a direct effect upon production.

LIGHTING for industrial purposes has been developed to a high state of efficiency, but conditions are far below those of proved profitable standards. High-intensity illumination reduces spoilage of production materials and accidents and increases worker efficiency. Industrial lighting alone offers a prospective market for $100,000,000 of equipment.

ELECTRON TUBE CONTROL, through its probable incursion into industrial work now handled by other methods or not at all, offers another broad equipment market.

. . . . a $2,770,000,000 Market



THE INDUSTRIAL MARKET

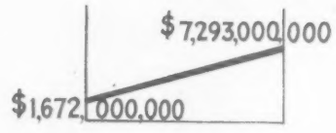
	Present	Available
Number of customers	515,000	630,000
Value of equipment and wiring	$440,000,000	$1,520,000,000
Consumption, kw.-hr.	33,500,000,000	128,000,000,000
Annual revenue for service	$355,000,000	$1,250,000,000

——and there it is—in the home—on the farm—on Main Street, in office, store, theater, hotel—in the great transportation systems of the country—in industrial plants. LIGHT, HEAT, POWER . . . A $73,000,000,000 market which has only been developed 30 per cent in 50 years . . . $51,000,000,000 waiting for enterprise by the electrical industry.

THE ENERGY MARKET

For the Utility

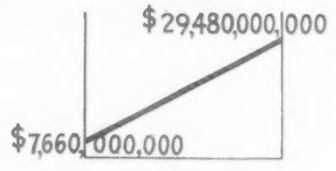
	ANNUAL SALES	
	Present	Available
Domestic	$705,000,000	$3,750,000,000
Commercial lighting	450,000,000	1,200,000,000
Industrial power	300,000,000	650,000,000
Commercial cooking	6,300,000	63,000,000
Railroads	60,000,000	180,000,000
Street lighting, etc.	96,000,000	850,000,000
Total	$1,672,300,000	$7,293,000,000



THE EQUIPMENT MARKET (Energy-using)

For the Maker of Energy-Using Equipment

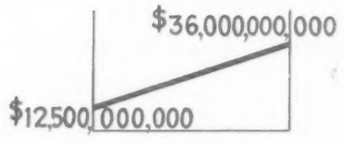
	Present	Available
Domestic	$4,000,000,000	$16,000,000,000
Commercial lighting	350,000,000	1,460,000,000
Industrial power	240,000,000	520,000,000
Industrial heating processes	200,000,000	1,000,000,000
Transportation	2,500,000,000	7,500,000,000
Streets and highways	370,000,000	3,000,000,000
	$7,660,000,000	$29,480,000,000



UTILITIES' INVESTMENT (Market for Equipment)

For the Maker of Utility Apparatus

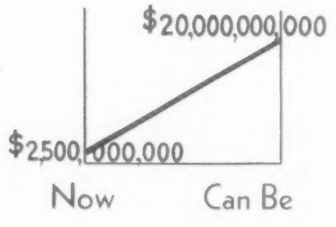
To serve the expanded market, as above	Present	Required
	$12,500,000,000	$36,000,000,000



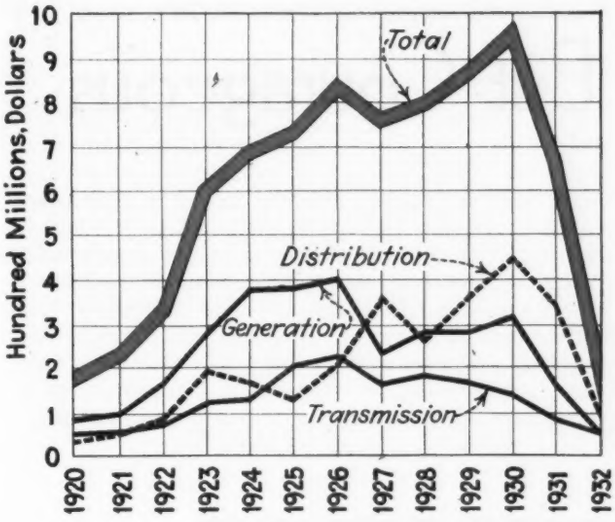
ELECTRICAL MANUFACTURERS' INVESTMENT

For the Investor

To produce the appliances and equipment needed	Present	Required
	$2,500,000,000	$20,000,000,000



What other industry, activity or cause holds such great and tangible potentialities as this, America's untouched $51,000,000,000 market. There it is—there it waits.



1933 utility budgets are estimated to total about $250,000,000

Capital Expenditures Decrease

CAPITAL expenditures in 1933 depend very largely on an increase in industrial load. If industry turns its power on, the present excess capacity of utilities will be reduced to a normal 10 per cent because of the increase in domestic load during the past three years. Expenditures for more station capacity would then follow, but until industrial load recovers utility expenditures will largely be based on maintenance and the revamping of distribution systems. With so much uncertainty in the immediate future budget estimates for 1933 expenditures are rather meaningless.

Generation and Transmission Expenditures

(Thousands of Dollars)

Year	Total Construction Budgets	Total for Generating Plants	Total for Transmission Distribution	Miscellaneous† Expenditures
1921.....	$222,408	$102,674	$119,734	.....
1922.....	324,016	164,333	159,683	.....
1923.....	602,143	283,813	318,330	.....
1924.....	692,440	379,240	313,200	.....
1925.....	721,300	380,000	341,300	.....
1926.....	841,344	400,107	441,237	.....
1927.....	760,353	234,883	525,470	.....
1928.....	786,978	284,874	453,796	48,308
1929.....	866,344	281,460	528,896	55,988
1930.....	960,889	325,296	569,654	65,938
1931.....	633,415	162,843	428,797	41,775
1932.....	260,000	46,000	199,000	15,000

†Not separated in earlier years.

Steam Power Plant Expenditures

(Thousands of Dollars)

Year	Eastern	Southern	North Central	Western	Totals for U. S.
1926.....	$80,107	$30,000	$120,000	$25,000	**$255,107**
1927.....	53,593	35,128	43,585	13,711	**146,017**
1928.....	49,841	45,537	58,749	16,906	**171,033**
1929.....	53,891	37,600	75,299	15,758	**182,548**
1930.....	56,226	35,866	94,013	21,794	**207,901**
1931.....	28,582	14,396	41,731	11,437	**96,147**
1932.....	13,800	4,700	15,100	6,400	**40,000**

Hydro Plant Expenditures

(Thousands of Dollars)

Year	Eastern	Southern	North Central	Western	Totals for U. S.
1926.....	$20,000	$60,000	$20,000	$45,000	**$145,000**
1927.....	39,436	21,913	6,020	21,497	**88,866**
1928.....	38,717	43,926	8,610	22,588	**113,841**
1929.....	28,784	21,575	25,071	23,482	**98,912**
1930.....	36,461	31,229	17,746	39,007	**117,395**
1931.....	27,949	6,547	10,932	21,266	**66,695**
1932.....	1,400	500	1,200	2,900	**6,000**

System Expenditures by Sections

Year	Eastern	Southern	North Central	Western
1921.....	$43,136,000	$29,341,000	$67,900,000	$82,031,000
1922.....	101,525,000	49,805,000	96,700,000	75,986,000
1923.....	211,196,000	82,105,000	206,180,000	102,662,000
1924.....	259,196,000	104,460,000	218,950,000	109,180,000
1925.....	190,300,000	130,500,000	260,200,000	140,300,000
1926.....	200,107,000	190,500,000	280,605,000	170,132,000
1927.....	247,961,000	191,190,000	213,994,000	107,208,000
1928.....	253,277,000	182,322,000	244,060,000	107,319,000
1929.....	265,847,000	176,585,000	293,564,000	130,348,000
1930.....	308,596,932	194,395,948	318,096,822	139,800,040
1931.....	201,696,625	114,034,925	208,641,731	109,041,739
1932.....	88,600,000	42,800,000	79,000,000	49,600,000

Transmission Expenditures

(Thousands of Dollars)

Year	Eastern	Southern	North Central	Western	Totals for U. S.
1926.....	$50,000	$60,456	$60,605	$60,000	**$231,061**
1927.....	32,147	47,830	61,055	22,121	**163,153**
1928.....	71,097	28,999	67,519	18,575	**186,190**
1929.....	44,015	35,059	60,589	27,902	**167,565**
1930.....	42,601	33,910	48,910	15,662	**137,085**
1931.....	25,966	11,881	24,096	18,969	**80,913**
1932.....	12,600	5,400	11,600	12,400	**42,000**

Distribution Expenditures

(Thousands of Dollars)

Year	Eastern	Southern	North Central	Western	Totals for U. S.
1926.....	$50,000	$40,044	$80,000	$40,132	**$210,176**
1927.....	122,785	86,320	103,344	49,878	**362,317**
1928.....	80,927	51,753	88,960	45,966	**267,606**
1929.....	122,401	73,457	109,444	56,029	**361,331**
1930.....	152,762	103,079	128,784	58,540	**432,570**
1931.....	106,650	74,813	116,090	50,329	**347,883**
1932.....	55,000	30,000	47,000	25,000	**157,000**

Manufacturers Hit But Courageous

VALUES for electrical manufactured products in 1931 were 50 per cent less than in 1929 and a decrease of 40 per cent over 1931 values occurred in 1932. This is a depression record. The tables show the census data on product sales and late returns show a general decrease in 1932 applied to all products. During this depression electrical manufacturers have maintained their morale and price stability; they have gone after business earnestly and vigorously, but after all this was done their net incomes were recorded as deficits.

These facts as to actual business would be disheartening were it not for the market possibilities outlined in this issue. With this business in sight and current sales negotiations increasing electrical manufacturers look to 1933 with confidence that better business will result. The recent increase in power use, the need for maintenance, the economic value of modernization of industrial plants, the home market and the technological improvement in power equipment for utility use unite to offer a fair prospect for a greater volume of business this year.

Production of Electrical Machinery, Apparatus and Supplies

By Class and Value; based on U. S. Census, expressed in round numbers

	—Thousand Dollars— 1931	1929
Electrical machinery, apparatus and supplies (all industries, aggregate value)	**969,800**	**1,918,700**
Made in the "electrical machinery, apparatus and supplies" industry	**917,500**	**1,733,500**
Made as secondary products in other industries	**52,300**	**185,200**
Generators, motor-generator sets and automotive generators	34,000	80,900
Switchboards, circuit breakers and switches	44,300	81,200
Transformers, induction voltage regulators and current limiting reactors	42,700	84,000
Measuring instruments, meters, relays and instrument and meter transformers	22,700	38,500
Motors (including automotive starters, but not including control apparatus) and motor parts and supplies	94,700	194,800
Control apparatus	22,200	44,300
Electric fans	8,700	10,200
Industrial and commercial apparatus and appliances (not including motor-driven tools)	16,800	28,600
Batteries and parts and supplies	85,900	149,900
Incandescent-filament lamps (not including sockets and other fittings), X-ray tubes and other completed sealed glass lighting units	70,400	85,300
Household apparatus and appliances	51,000	84,500
Insulated wire and cable	120,600	312,600
Wiring devices	21,800	38,400
Conduits and fittings	29,100	58,200
Fuses and fuse blocks	7,700	14,000
Ignition apparatus for internal combustion engines	27,800	58,600
Electrotherapeutic and electromedical (including dental) apparatus	9,100	23,600
Miscellaneous electrical machinery, apparatus and supplies	260,500	531,000

Growth in Electrical Manufacturing in Seventeen Years

Based on U. S. Census; dollar figures in round numbers.

Year	—Number of— Companies	Employees	—Thousand Dollars— Wages	Cost of Raw Material	Value of Product	Value Added by Manufacturing	Horsepower Used
1914	1,030	118,078	73,800	154,700	335,200	180,400	226,320
1919	1,404	212,374	238,200	425,100	998,000	572,900	438,082
1921	1,333	161,204	194,200	344,100	834,000	489,900	.....
1923	1,671	234,892	305,500	548,600	1,293,000	744,400	480,268
1925	1,739	339,921	323,800	636,700	1,540,000	903,300	589,398
1927	1,777	241,566	336,200	645,800	1,637,300	991,500	661,168
1929	1,802	328,722	456,400	971,000	2,300,900	1,329,900	893,519
1931	1,603	216,437	239,500	425,600	1,187,800	762,200	.....

Production of Major Equipment Over Last Seventeen Years

Round figures, based on U. S. Census

	Thousands of Dollars							
	1914	1919	1921	1923	1925	1927	1929	1931
Generators, motor-generators, etc.	17,900	86,300	65,200	106,400	110,200	104,200	80,900	34,000
Switchboards and gear	15,400	26,300	36,300	57,900	69,800	71,900	81,200	44,300
Transformers	14,500	27,100	42,100	59,100	62,200	66,800	84,000	42,700
Motors and parts	44,200	116,900	74,500	109,200	113,100	111,800	194,800	94,700
Lamps, incandescent	17,400	57,600	59,700	72,000	73,600	88,000	85,300	70,400
Household appliances	.....	.....	37,700	63,900	75,100	77,500	84,500	51,000
Radio apparatus	792	8,100	10,600	54,000	178,800	198,400	411,600	192,300
Wiring devices	7,600	26,900	21,800	35,000	34,800	32,700	38,400	21,800

Detail Production of Apparatus and Supplies

Based on U. S. Census but expressed in round numbers

	Thousand Dollars	
	1931	1929
Generators (a.c.)	10,100	21,800
Synchronous condensers and frequency changers	2,500	4,200
Motor-generator sets	5,800	13,400
Switchboards	8,000	19,700
Panelboards	4,700	7,000
Circuit breakers (air)	4,500	5,500
Circuit breakers (oil)	8,600	24,500
Switches (disconnect)	3,100	7,000
Switches (knife)	3,400	9,100
Switchgear—metal inclosed	6,400	1,500
Transformers—power	15,700	29,000
Transformers—dist. to 500 kva.	23,800	50,200
Meters	19,400	31,700
Relays and instrument transformers	3,500	6,800
Motors—fractional hp.	37,200	56,100
Motors—1 hp. and over	34,800	74,800

	Thousand Dollars	
	1931	1929
Motors—railway and vehicle	13,500	26,000
Control—industrial	22.200	44,300
Automotive starters	13,000	32,900
Fans	8,700	10,200
Furnaces—industrial	2,000	5,200
Heating devices—industrial	2,300	4,800
Welding appliances and supplies	6,700	10,700
Batteries and parts	86,000	150,000
Lamps—incandescent	70,400	85,300
Household appliances	51,000	84,500
Insulated wire and cable	120,600	312,600
Wiring devices	21,800	38,400
Conduits and fittings	29,100	58,200
Fuses and fuse blocks	7,700	14,000
Arresters and choke coils	3,300	6.500

Courtesy General Electric

Business and Financial Status of

Name of Company	Net Sales 1931	Net Sales 1930	Gross Profit 1931	Gross Profit 1930	Book Value of Plant and Equipment 1931	Book Value of Plant and Equipment 1930	Funded Debt 1931	Funded Debt 1930
Acme Wire Company	.....	.....	188,170*‡	204,993*‡	647,939	731,465	Nil	Nil
Air-Way Electric Appliance Co	.....	.....	258,307‡	686,763	874,894*	890,456*	Nil	Nil
Altorfer Brothers Company	2,310,688	3,734,401	236,103‡	512,201	1,101,633*	1,115,954*	Nil	Nil
Allis-Chalmers Mfg. Company	27,800,639	41,475,949	1,567,565	4,667,874	27,937,448	24,736,224	13,996,000	13,893,039
American Transformer Company	404,348	586,288	21,996	27,002‡	180,776*	192,979*	Nil	Nil
Anaconda Wire and Cable Company	.....	.....	1,868,497	2,374,220	16,238,321	15,868,258	Nil	Nil
Apex Electrical Mfg. Company	.....	.....	.....	.....	1,410,128	1,411,268	Nil	Nil
Arrow-Hart and Hageman Elec. Co.	.....	.....	615,686	.....	2,899,205*	2,934,422*	Nil	Nil
Automatic Washer Company	1,189,710	2,193,370	118,326‡	101,443	472,081	523,962	Nil	Nil
Belden Mfg. Company	3,025,489	4,070,299	13,512	90,636	1,601,014*	1,717,889*	450,000	500,000
Benjamin Electric Mfg. Company	.....	.....	543,261	635,305	1,486,183*	1,579,763*	960,500	1,200,200
Birtmann Electric Company	.....	.....	.....	606,991	1,021,577*	1,091,095*	Nil	Nil
Bright Star Electric Company	1,332,038	1,652,752	.....	.....	140,221*	174,521*	Nil	Nil
Chicago Electric Mfg. Company	580,766	592,999	16,656	4,900‡	418,722*	428,962*	Nil	Nil
Century Electric Company	.....	.....	1,415,010	1,991,963	4,133,273*	4,184,008*	Nil	Nil
Crocker-Wheeler Electric Mfg. Co.	.....	.....	133,518‡	267,008	2,949,508*	2,926,950*	Nil	Nil
Cutler-Hammer, Inc.	5,912,792	9,342,899	326,176‡	1,531,664	2,931,719*	3,257,688*	Nil	Nil
Copeland Products, Inc	4,991,243	4,209,188	546,686	268,860	588,552	467,078	Nil	Nil
Driver-Harris Company	2,430,913	3,868,882	21,382‡	508,847	1,500,783*	1,533,213*	784,000	815,500
Easy Washing Machine Company	.....	.....	254,093	391,611	65,476*	88,545*	Nil	Nil
Electric Auto-Lite Company	.....	.....	4,100,974	7,059,085	11,303,557*	12,555,474*	Nil	Nil
Electric Controller & Mfg. Co	.....	.....	106,146‡	515,270	455,133*	484,484	Nil	Nil
Elwell-Parker Electric Co.	.....	.....	10,032‡	124,089	398,619	359,365	Nil	Nil
Electric Household Utilities Corp.	.....	.....	2,668,296	4,659,291	1,953,589*	2,132,554*	Nil	Nil
Electric Storage Battery Co.	24,895,114	36,889,454	3,025,458	6,289,300	25,955,604	25,849,151	Nil	Nil
Eureka Vacuum Cleaner Co.	4,296,520	6,971,406	825,172‡	275,378‡	1,023,770*	1,246,509*	Nil	Nil
Fairbanks Morse and Co.	15,617,817†	24,126,049	3,502,959‡	2,004,909	13,112,929*	13,193,370*	6,429,000	6,883,500
Federal Electric Company	9,922,811	13,067,215	266,153	561,300	6,496,657*	6,495,812*	1,054,000	1,054,750
Formica Insulation Co.	1,731,247	2,309,829	144,965	332,705	1,232,988	1,207,001	Nil	Nil
Grigsby-Grunow Corp.	28,350,881	61,330,216	682,855	3,934,243	14,815,365	.....	3,025,200	.....
Gamewell Company	.....	.....	878,943	1,131,801	2,073,662*	1,309,486*	Nil	Nil
General Electric Company	263,275,255	376,167,428	41,390,229‡	60,525,464	46,061,019*	45,867,930*	2,047,000	2,047,000
Hygrade Sylvania Corp.	.....	.....	3,267,565	.....	1,411,798*	.....	Nil	Nil
Howell Elect. Motors Inc	662,460	1,029,857	60,928‡	31,427	397,932*	415,318*	25,400	34,000
Kelvinator Corp	20,011,399	21,450,896	2,577,443	2,211,354	7,677,289*	4,628,165*	1,073,000	1,603,500
Kodel Electric & Mfg. Co	596,103	912,302	61,655‡	11,852	370,996*	380,553*	Nil	Nil
Landers, Frary and Clark	.....	.....	1,083,766	1,440,395	4,529,304	4,676,916	Nil	Nil
Line Material Company	3,216,761	4,515,969	175,307	375,828	1,047,464*	1,159,652*	785,400	900,000
Manning Bowman Co.	.....	.....	.....	.....	700,384*	719,521*	Nil	Nil
Maytag Company	9,206,386	14,470,938	888,925	1,954,667	3,355,423*	3,587,317*	Nil	Nil
McGraw-Electric Company	3,092,257	3,990,101	188,931	405,383	734,966*	797,122*	Nil	Nil
Moloney Electric Company	.....	.....	.....	.....	1,036,559	1,088,845	1,291,500	1,376,500
Ohio Brass Company	.....	.....	.....	.....	3,862,575	4,034,095	Nil	Nil
Otis Elevator Company	.....	.....	5,177,563	8,151,633	16,964,756*	17,546,625*	Nil	Nil
Syracuse Washing Machine Co.	6,502,373	6,744,709	219,347	71,966‡	1,637,231*	1,793,731*	Nil	Nil
Wagner Electric Company	.....	.....	383,469	904,345	3,197,040*	3,369,740*	Nil	Nil
Westinghouse Electric & Mfg. Co.	115,393,082	180,283,580	1,518,254	1,848,538	73,539,536*	72,272,128*	Nil	Nil
Weston Electric Instr. Corp.	.....	.....	122,265	615,075	1,793,555*	1,519,998*	55,000	Nil

* After deducting depreciation.

† Consolidated balance sheet excludes Municipal Acceptance Corporation. ‡ Net profit after all expenses including depreciation.

Representative Electrical Manufacturers

Surplus and Reserves		Working Capital		Net Income		Net Worth		Depreciation		Earned per Share Common	
1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930
.....	145,032	704,957	814,404	198,797‡	219,380‡	1,444,750	1,588,982	91,717	97,160	Nil	Nil
1,026,071	1,828,413	2,072,029	2,749,696	316,376‡	563,192	3,403,571	4,266,413	58,069	53,703	Nil	1.07
104,367	422,373	636,826	968,502	236,103‡	459,938	1,885,061	2,322,067	.....	.....	Nil	2.47
16,840,314	17,399,111	28,029,247	28,591,481	1,256,431	3,604,609	56,303,421	53,436,137	976,482	857,351	0.96	2.86
64,940	75,495	319,220	164,225	9,284‡	28,506‡	364,940	375,495	15,217	Nil	Nil	Nil
842,741	1,500,019	4,435,512	5,522,400	18,681	278,992	21,113,459	21,760,977	690,684	587,809	0.04	0.66
1,681,256	1,677,506	1,280,185	1,285,400	157,549	223,762	2,793,556	2,812,700	.....	.....	1.05	1.80
2,483,573	3,033,366	3,065,502	3,648,780	250,713	522,529	7,135,073	7,761,666	303,334	.....	0.65	1.99
218,759	205,987	386,079	242,554	234,228‡	5,712	1,202,699	1,189,927	212,682	242,554	Nil	Nil
375,222	616,145	918,126	1,060,969	168,867‡	209,010‡	2,243,222	2,484,145	182,379	191,472	Nil	Nil
1,258,432	1,193,681	2,033,912	1,991,486	246,931	300,754	3,254,432	3,220,981	158,543	137,762	22.74	30.51
1,123,093	1,240,917	758,614	907,311	56,092	171,297	1,830,568	1,953,147	77,831	.....	0.15	1.04
.....	.....	236,670	309,034	109,116‡	188,344‡	413,574	521,604	.....	.....	Nil	Nil
164,317	161,358	336,816	324,963	2,958	23,675‡	786,220	783,761	35,000	28,467	Nil	Nil
926,583	1,238,383	1,971,270	2,175,811	49,099‡	88,200‡	5,615,983	5,820,783	340,144	413,855	Nil	Nil
673,623	912,381	1,082,959	1,412,293	228,346‡	143,973	4,185,983	4,424,741	90,026	92,504	Nil	0.50
4,110,810	4,929,781	3,136,926	3,449,402	501,020‡	1,190,289	7,410,805	8,229,781	245,675	272,462	Nil	3.61
339,411	10,000	720,887	543,057	314,411	107,039	1,357,845	1,055,017	117,433	80,584	6.05	2.05
1,108,663	1,382,154	1,626,021	1,808,888	202,779‡	259,568	3,043,763	3,336,254	144,326	154,774	Nil	2.07
216,269‡	61,071	271,277	523,058	113,033‡	81,012‡	15,916	316,325	3,686	.....	Nil	Nil
11,134,644	12,367,786	5,180,220	6,234,926	3,913,833	5,043,402	11,044,754	22,229,965	954,760	1,233,181	3.89	5.13
1,844,719	2,305,140	1,679,939	2,098,470	106,146‡	462,020	2,198,944	2,659,415	.....	.....	Nil	6.52
1,255,052	1,267,129	954,243	1,004,586	10,032‡	110,263	1,355,052	1,367,129	.....	.....	Nil	5.51
1,778,801	3,403,525	3,793,113	4,694,565	424,990‡	1,234,991	5,748,952	7,522,658	261,156	223,045	Nil	3.00
13,002,565	14,651,625	22,958,227	23,697,558	2,770,548	5,647,300	23,518,657	24,177,718	.....	.....	3.06	6.23
2,479,920	4,076,464	2,297,096	3,483,233	1,163,096‡	584,085‡	3,496,572	5,178,936	77,717	78,750	Nil	Nil
8,259,092	14,224,214	13,309,968	19,098,567	2,482,640‡	1,358,445	22,681,787	28,737,609	835,442	826,348	Nil	11.81
2,098,599	2,096,059	1,570,838	1,945,095	362,096	382,973	5,492,099	7,389,559	88,672	91,326	3.11	3.64
.....	.....	538,376	746,219	127,830	294,066	1,893,413	2,080,583	.....	.....	0.71	1.63
1,890,434	.....	5,056,748	.....	2,169,762‡	.....	21,549,106	.....	1,035,641	.....	Nil	0.87
924,288	926,981	4,261,495	3,529,690	740,347	1,025,225	7,510,590	5,077,668	138,596	106,576	4.85	8.62
191,179,468	228,104,691	190,603,722	201,961,199	40,956,996	57,490,915	414,396,149	451,321,372	.....	.....	1.33	1.90
909,229	.....	2,447,882	.....	1,414,269	1,397,064	4,262,649	.....	384,779	.....	6.53	.....
127,502	215,849	127,076	238,670	194,048‡	12,708	690,088	778,566	.....	.....	Nil	Nil
3,777,644	2,409,902	6,107,469	5,960,298	2,072,413	1,866,270	15,815,755	14,720,986	505,030	345,084	1.53	1.35
136,644‡	19,851	20,343	150,708	91,756‡	754‡	481,316	637,811	.....	.....	Nil	Nil
5,455,374	6,423,601	11,179,330	11,972,393	711,773	1,064,661	15,955,374	16,923,601	371,993	375,734	1.69	2.53
696,327	747,724	1,568,415	1,627,652	199,307	375,828	1,975,776	2,027,173	.....	.....	0.48	1.39
247,881‡	163,656	243,458	612,555	260,785‡	303,528‡	1,032,119	1,443,656	.....	.....	Nil	Nil
921,675	2,047,147	4,712,547	6,451,250	621,437	1,713,354	7,207,175	9,832,647	267,488	241,313	Nil	0.43
1,036,759	1,004,618	1,114,328	1,307,054	188,931	405,383	4,005,509	3,973,364	.....	.....	0.75	1.62
534,697	804,975	2,143,237	1,925,601	39,044	622,220	2,293,987	2,563,265	.....	.....	Nil	8.08
.....	.....	6,005,151	7,014,342	113,773‡	1,817,519	7,867,726	9,048,438	.....	.....	Nil	4.88
17,739,622	18,782,732	23,130,408	25,125,198	4,414,963	7,265,050	49,239,622	50,282,732	762,600	886,583	2.01	3.44
2,004,472	1,713,853	2,243,131	1,712,905	219,347	71,966‡	4,459,944	4,412,421	.....	.....	0.42	Nil
1,810,629	2,038,641	5,479,608	5,522,117	348,748	813,362	8,890,256	9,187,969	.....	.....	0.67	1.85
79,050,032	95,373,912	93,154,477	99,917,266	3,655,660‡	11,881,706	212,358,074	228,689,662	5,173,914	6,603,680	Nil	4.44
1,249,499	1,252,373	1,662,898	1,772,660	122,265	615,075	3,749,499	3,502,373	.....	.....	0.32	3.45

Net worth = Stock, surplus and reserves. Net income = Balance to common and reserves.
Gross income = Operating income, etc., less operating expenses but not including deductions of depreciation. Working capital = Current assets — Current liabilities.

Directory of Electrical Associations

AMERICAN ASSOCIATION OF ENGINEERS, Secretary, M. E. McIver, 8 South Michigan Ave., Chicago, Ill.

AMERICAN ENGINEERING COUNCIL. Executive secretary. L. W. Wallace, 744 Jackson Place, Washington, D. C.

AMERICAN INSTITUTE OF CONSULTING ENGINEERS, INC. Secretary, P. W. Henry, 75 West St., New York, N. Y.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. National secretary, H. H. Henline, 33 West 39th St., New York, N. Y.

AMERICAN SOCIETY FOR TESTING MATERIALS. Secretary-treasurer, C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Secretary, Calvin W. Rice, 29 West 39th St., New York, N. Y.

AMERICAN STANDARDS ASSOCIATION. Secretary, P. G. Agnew, 29 West 39th St., New York, N. Y.

AMERICAN TRANSIT ASSOCIATION. General secretary, Guy C. Hecker, 292 Madison, Ave., New York, N. Y.

AMERICAN WELDING SOCIETY. Secretary, M. M. Kelly, 29 West 39th St., New York, N. Y.

ARIZONA UTILITIES ASSOCIATION. Executive secretary, J. S. Arnold, Central Arizona Light & Power Co., Phoenix, Ariz.

ARKANSAS UTILITIES ASSOCIATION. Secretary-treasurer, R. E. Ritchie, Arkansas Power & Light Company, 115½ West Fourth Street, Little Rock, Ark.

ARTISTIC LIGHTING EQUIPMENT ASSOCIATION. Secretary, James Krieger, 215 Fourth Ave., New York, N. Y.

ASSOCIATION OF EDISON ILLUMINATING COMPANIES. Secretary, Preston S. Miller, 80th St. and East End Ave., New York, N. Y.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. Managing director, John F. Kelly, Empire Bldg., Pittsburgh, Pa.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS. Secretary-treasurer, Joseph A. Andreucetti, Room 1519, Daily News Bldg., 400 West Madison St., Chicago, Ill.

CANADIAN ELECTRICAL ASSOCIATION (affiliated with N.E.L.A.). Secretary, B. C. Fairchild, 409 Power Bldg., Montreal.

CANADIAN ENGINEERING STANDARDS ASSOCIATION. Secretary, B. Stuart McKenzie, 79 Sussex St., Ottawa, Ont.

EAST CENTRAL GEOGRAPHIC DIVISION, N.E.L.A. Secretary, D. L. Gaskill, 603 Broadway, Greenville, Ohio.

EASTERN GEOGRAPHIC DIVISION, N.E.L.A. Secretary-treasurer, Harold A. Buch, Telegraph Building, Harrisburg, Pa. Managing director, A. B. Millar.

ELECTRIC ASSOCIATION (THE) (Chicago), Manager, Ralph S. Steffens, 20 North Wacker Drive, Chicago, Ill.

ELECTRICAL ASSOCIATION OF NEW YORK, INC. Managing Director, R. Neumuller, Grand Central Palace, New York, N. Y.

ELECTRICAL ASSOCIATION OF PHILADELPHIA. Manager, George R. Conover, 17th at Samson, Philadelphia, Pa.

ELECTRICAL LEAGUE OF COLORADO. Executive Manager, John J. Cooper, Gas & Electric Bldg., Denver, Colo.

ELECTRICAL LEAGUE OF UTAH. Executive secretary, R. E. Folland, Chamber of Commerce Bldg., Salt Lake City, Utah.

ELECTROCHEMICAL SOCIETY, INC. (THE). Secretary, Colin G. Fink, Columbia University, New York, N. Y.

EMPIRE STATE GAS AND ELECTRIC ASSOCIATION. Secretary, Charles H. B. Chapin, Grand Central Terminal, New York, N. Y.

FLORIDA ENGINEERING SOCIETY. Secretary, W. W. Fineren, Gainesville, Fla.

GREAT LAKES GEOGRAPHIC DIVISION, N.E.L.A. Secretary-treasurer, Tom C. Polk, 20 North Wacker Drive, Chicago,

ILLUMINATING ENGINEERING SOCIETY. General secretary, D. W. Atwater, 29 West 39th St., New York, N. Y.

ILLUMINATING GLASSWARE GUILD. Assistant business manager, C. H. Ferris, Stevenson Corp., 19 West 44th St., New York, N. Y.

INSTITUTE OF RADIO ENGINEERS. Secretary, Harold P. Westman, 33 West 39th St., New York, N. Y.

INTERNATIONAL ASSOCIATION OF ELECTRICAL INSPECTORS. Secretary-treasurer, Victor H. Tousley, 612 N. Michigan Ave., Chicago, Ill. Sections: Eastern, F. N. M. Squires, 16 Court St., Brooklyn, N. Y.; Western, Wm. S. Boyd, 175 W. Jackson Blvd., Chicago, Ill.; Northwestern, F. D. Weber, P. O. Box 745, Portland, Ore.; Southwestern, C. W. Mitchell, 914 Merchants' Exchange Bldg., San Francisco, Cal.; Southern, Jos. Whitner, P. O. Box 1743, Atlanta, Ga.

INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Secretary, W. H. Harth, City Hall, Columbia, S. C.

INTERNATIONAL COMMISSION ON ILLUMINATION. General secretary, J. E. Preston, National Physical Laboratory, Teddington, England. Secretary-treasurer of U. S. National Committee, G. H. Stickney, Nela Park, Cleveland, Ohio.

INTERNATIONAL ELECTROTECHNICAL COMMISSION (international body formed of 26 national electrotechnical committees). General secretary, C. le Maistre, 28 Victoria St., Westminster, London, S. W., England.

IOWA PUBLIC UTILITIES ASSOCIATION. Managing Director, Joe Carmichael, 310 Crocker Bldg., Des Moines, Ia.

KANSAS SECTION, N.E.L.A. Secretary, Mrs. Lillian M. Jacoby, Kansas Gas & Electric Co., Wichita, Kan.

KENTUCKY ASSOCIATION OF PUBLIC UTILITIES. Secretary, E. F. Kelley, 1109 Kentucky Home Life Bldg., Louisville, Ky.

MARYLAND UTILITIES ASSOCIATION. Secretary, D. E. Kinnear, United Railways & Electric Co. of Baltimore, 803 Court Square Bldg., Baltimore, Md.

MICHIGAN ELECTRIC LIGHT ASSOCIATION, Secretary, Herbert Silvester, P. O. Box 18, Ann Arbor, Mich.

MIDDLE WEST GEOGRAPHIC DIVISION, N.E.L.A. Director, Thorne Browne, 1527 Sharp Bldg., Lincoln, Neb.

MISSOURI ASSOCIATION OF PUBLIC UTILITIES. Secretary, N. R. Beagle, Jefferson City, Mo.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS. Secretary, James B. Walker, 270 Madison Ave., New York. N. Y.

NATIONAL COMMITTEE ON THE RELATION OF ELECTRICITY TO AGRICULTURE. Director, E. A. White, 1120 Garland Bldg., Chicago.

NATIONAL ELECTRIC LIGHT ASSOCIATION, Secretary, A. Jackson Marshall, 420 Lexington Avenue, New York, N. Y.

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION. Secretary, Laurence W. Davis, 420 Lexington Ave., New York, N. Y.

NATIONAL ELECTRICAL CREDIT ASSOCIATION. Secretary, Frederick A. Lind, 1010 Marquette Building, Chicago, Ill. Central, New England, New York and Middle and Southern Atlantic States Divisions.

NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION. Managing director, A. W. Berresford, 570 Lexington Ave., New York, N. Y.

NATIONAL ELECTRICAL WHOLESALERS' ASSOCIATION. Managing director, E. Donald Tolles, 165 Broadway, New York City. Pacific Coast Division: secretary, Albert H. Elliott, 903 Flatiron Bldg., San Francisco.

NATIONAL FIRE PROTECTION ASSOCIATION. Chairman of electrical committee, A. R. Small, 109 Leonard St., New York; secretary of electrical committee, V. H. Tousley, 612 N. Michigan Blvd., Chicago.

NATIONAL SAFETY COUNCIL, INC., Managing director and secretary, W. H. Cameron, Civic Opera Building, 20 North Wacker Drive, Chicago, Ill.

NEBRASKA SECTION, N.E.L.A. Secretary-treasurer, Thorne Browne, 1527 Sharp Building, Lincoln, Neb.

NEW ENGLAND GEOGRAPHIC DIVISION, N.E.L.A. Secretary, Miss O. A. Bursiel, Statler Building, 20 Providence St., Boston, Mass.

NEW YORK ELECTRICAL SOCIETY, INC. Secretary, E. E. Dorting, 29 West 39th St., New York, N. Y.

NORTH CENTRAL ELECTRIC ASSOCIATION (Geographic Division N.E.L.A.). Secretary-manager, J. W. Lapham, 803 Plymouth Bldg., Minneapolis, Minn.

NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION (Northwest Geographic Division N.E.L.A.). Secretary, Berkeley Snow, 707 Spalding Building, Portland, Ore.

OKLAHOMA UTILITIES ASSOCIATION. Manager, E. F. McKay, 1020 Petroleum Building, Oklahoma City, Okla.

PACIFIC COAST ELECTRICAL ASSOCIATION (Geographic Division N.E.L.A.). Managing Director, K. I. Dazey, Room 630, 447 Sutter St., San Francisco, Calif.

PENNSYLVANIA ELECTRIC ASSOCIATION, Managing director, A. B. Millar; secretary-treasurer, Harold A. Buch, Telegraph Bldg., Harrisburg, Pa.

PUBLIC UTILITIES ASSOCIATION OF VIRGINIA. President, T. Justin Moore, Virginia Electric & Power Co., Richmond, Va.

PUBLIC UTILITIES ASSOCIATION OF WEST VIRGINIA. Secretary, A. Bliss McCrum, P.O. Box 1483, Charleston, W. Va.

ROCKY MOUNTAIN GEOGRAPHIC DIVISION, N.E.L.A. Secretary and Managing Director, George E. Lewis, 336 Gas and Electric Bldg., Denver, Col.

SOCIETY FOR ELECTRICAL DEVELOPMENT, INC. Secretary-treasurer, J. Smieton, Jr., 420 Lexington Ave., New York, N. Y.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Secretary, Prof. F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

SOCIETY OF INDUSTRIAL ENGINEERS. Secretary, Geo. C. Dent, 205 West Wacker Drive, Chicago, Ill.

SOUTHEASTERN GEOGRAPHIC DIVISION, N.E.L.A. Executive secretary, C. M. Kilian, 508-9 Haas-Howell Bldg., Atlanta, Ga.

SOUTHWESTERN GEOGRAPHIC DIVISION, N.E.L.A. Secretary, S. J. Ballinger, San Antonio Public Service Company, San Antonio, Tex.

SOUTHWESTERN PUBLIC SERVICE ASSOCIATION, Secretary, E. N. Willis, 1801 No. Lamar Street, Dallas, Texas.

VERMONT ELECTRICAL ASSOCIATION. Secretary-treasurer, C. M. Jennings, Green Mountain Power Corp., 102 S. Winooski Ave., Burlington, Vt.

WESTERN SOCIETY OF ENGINEERS. Director and secretary, E. S. Nethercut, 205 West Wacker Drive, Chicago, Ill.

WISCONSIN ASSOCIATION OF ELECTRICAL CONTRACTOR-DEALERS. Secretary, E. H. Herzberg, 1602 W. Wells St., Milwaukee, Wis.

WISCONSIN UTILITIES ASSOCIATION. Executive secretary, John N. Cadby, 135 W. Wells St., Milwaukee, Wis.